

Journal of Mycology

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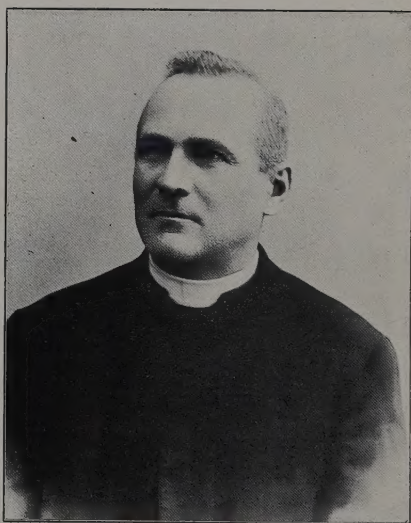
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MYCOLOGICAL EXPEDITION TO GUATEMALA.*

W. A. KELLERMAN.

During the winter months of January, February and March, 1905, a botanical trip was made to Guatemala, Central America, for the purpose of collecting parasitic fungi. A trip for like purpose was again made in the corresponding months of 1906. A large amount of material was collected for study, the results of which may appear from time to time in future Nos. of the JOURNAL. The itinerary only will be given in this article, with some account of the general botanical character of the regions visited. Later, notes will be published on the fungi, and some of the more interesting, as well as rare or new species, will be illustrated by a distribution of selected exsiccata.

GENERAL TOPOGRAPHY.

Guatemala is situated between 13.8 and 17.8 degrees north latitude, and 88.3 and 92.2 degrees longitude west of Greenwich. It embraces an area of 60,000 square miles, being bounded on the north by Mexico, Yucatan and Belize (or British Honduras); on the East by Belize, Bay of Honduras and Spanish Honduras; on the South by Honduras, San Salvador and the Pacific Ocean; and on the West by the Pacific Ocean and Mex-

* Contributions to Guatemalan Mycology. I.

ico. The entire country is of volcanic origin, a large portion being mountainous. The Cordilleras, considered a continuation and connecting range of the Rocky Mountains and of the Andes, traverse the region in a northwesterly and southeasterly direction, the crest being 50 miles from the Pacific Ocean. The altitude is about 8,000 feet in the West or Northwest to about 5,000 or 4,000 at the Southern boundary line of the Republic. The numerous volcanoes are of course much higher, reaching in many cases an altitude of 11,000 to 12,000 feet. From this range of the Cordilleras there is a very considerable extension of the mountain chain eastward to the Bay of Honduras; the height is about 3,000 feet, but considerably less as it approaches the eastern coast of the country. Here it is conspicuous by reason of a comparatively lofty peak (called San Gil), probably an extinct volcano (but as yet unexplored) that rises to a height of at least 1,500 feet. The chain just mentioned is called the Sierra de las Minas; the extreme eastern portion however is called Sierra del Mico. The portion of the country bordering on Honduras is also mountainous, but no considerable altitude is anywhere attained; several extinct small volcanoes occur here.

The land near the coast is low — the low area on the Pacific side being rather narrow, then gradually ascending so that at a distance of 30 or 40 miles the altitude is 1,000 feet. From that line the slope is very steep to the general crest of the Cordilleras. On the Atlantic side the low land is much more extensive. A great tropical swamp lies back to Puerto Barrios. An altitude of 500 feet would not be reached up the valley of the Motagua, or Rio Grande, short of 1000 miles from the coast. Following westward from the mouth of the Rio Dulce an altitude of 500 feet would be attained when Lake Izabal was passed — and a point reached perhaps 80 miles from the Bay of Honduras. Then the country (in the Department of Alta Verapaz) becomes mountainous. An exceedingly interesting topographical region is the extreme northern section, this Department being called El Petén. It is not mountainous; it has the general character of Yucatan. But there are great rivers and many lakes in Petén. The country has not been thoroughly traversed by explorers and is practically a terra incognita. The itinerary neither year included this enticing region though it is hoped that in the near future its mycological flora may be subjected to some scrutiny. Before passing in review the particular places visited, and sketching their general features in order to elucidate to some extent the character and distribution of the fungi that subsequent notes may disclose, a few words on the climatology and hydrography will be given — these being supreme factors determining the character and distribution of the vegetation.

CLIMATE.

While it is a tropical climate the varying altitudes afford considerable variation in temperature—this being more pronounced than the variation from season to season (Winter to Summer) in any given locality. As to the latter, it may be said that the Winter temperature is but slightly below that of the Summer months—perhaps 10 or 12 degrees. The daily range is not great—the nights however being quite cool—invariably 10 (or even 20) degrees or more below that of noonday. Near the coast the temperature is often about 90 degrees Fahrenheit. At an altitude of 5,000 feet 70 to 80 degrees may be considered a fair estimate for midday temperatures. At 8,000 feet, the highest point for which records are available, Quezaltenango, the temperature is much lower. The monthly extremes as recorded by Rev. W. E. McBath, of that city, are given below. A self recording instrument was used and the readings for the year 1905 were as follows,—the highest and lowest record for morning and for evening being shown:

January, A. M.,	26	and	49;	P. M.,	55	and	70°	F.
February, "	30	"	49;	"	61	"	73°	"
March, "	29	"	54;	"	70	"	79°	"
April, "	41	"	56;	"	70	"	80°	"
May, "	45	"	57;	"	70	"	78°	"
June, "	47	"	56;	"	65	"	77°	"
July, "	42	"	55;	"	62	"	74°	"
August, "	42	"	55;	"	65	"	75°	"
September, "	43	"	55;	"	63	"	75°	"
October, "	38	"	56;	"	62	"	73°	"
November, "	38	"	54;	"	66	"	72°	"
December, "	29	"	49;	"	63	"	69°	"

While no records can be given for the very high volcanoes, it can be stated that no freezing temperatures were experienced though the cold seemed very severe. No snow was seen during the winters of 1905 and '6. There is no snow line in the Republic of Guatemala, but the inhabitants state that at rare times snow is seen on the highest mountains.

HYDROGRAPHY.

Throughout the country there is an alternation of a rainy and a dry season. Abundant precipitation usually begins in May and ceases in October; the months between October and May constitute the dry season at which time no rains fall except in the low country near the coast and in the Department of Alta Verapaz. In the latter regions rains are common throughout the year but the precipitation is comparatively slight during the so-called

dry season. Clouds are formed continuously in the highest mountain regions and especially about the cones of the volcanoes, but the rainfall does not seem to be excessive at these altitudes. There is an arid region supporting a purely xerophytic vegetation, in the central portion of the country, beginning at Gualan, 80 miles from Puerto Barrios, in the valley of the Motagua, extending to El Rancho 130 miles from the Port just named; thence westward and northwestward through Salamã, in the Department of Baja Verapaz. Tree Cacti of the *Cereus* *Opuntia* and *Peireskia* types, and spinous *Leguminosae* are the characteristic forms. The grass and other vegetation seems to be absolutely dead during the dry season yet when the rains begin in the Spring everything becomes suddenly and intensely green, as if by magic. Here however the rainfall is less than in any other part of the Republic. This sharply marked seasonal change from extreme wet to extreme dry—each of the two seasons about the same length—accounts for the pronounced xerophytic aspect of the vegetation. The low-lying countries and the high peaks or crests of the mountains have however the usual character of moist tropical countries. Two of the mountain lakes are of considerable size; the largest Lake Atitlán, in the Department of Sololá, is about 8 or 10 miles in length and nearly as broad; it has a depth of 1,000 feet; there is no known outlet.

Lake Amatitlán, situated in the Department of Amatitlán, is about 7 or 8 miles long but only one to 3 miles wide; it is 75 to 100 feet deep, and is drained by the Rio Michatoya. The shore vegetation and that of the mountains forming the steep-sloping walls is strongly xerophytic in character. Some of the craters of the numerous extinct volcanoes are occupied by little lakes. Only two very large rivers, but with rather narrow valleys, drain the eastern side of the Republic—these being the Rio Grande, but usually called the Motagua, south of the Sierra de las Minas, and the Rio Dulce, called the Polochic above Lake Izabal, north of this mountain range. The Chixoy, further north called the Usumacinta, in the central part of the country, flows northward into Mexico. The rivers on the Pacific side are very numerous and need not be individually mentioned. For a correct account of the climate, rainfall, lakes and rivers of the Department of El Petén no sufficient data are at hand—besides, no mycological collections have as yet been made in that region.

PUERTO BARRIOS AND LIVINGSTON.

The places first visited for the purpose of making mycological collections in 1905 and 1906 were Puerto Barrios and Livingston on the Atlantic coast, that is to say on the Honduras Bay. Immediately back of the low mangrove-skirted coast at Puerto Barrios lies an extensive tropical swamp, covered by impene-

trable vegetation of ferns, palms, lianes and large trees. The Northern Railroad running southward for a distance from the coast, has opened up a line through this interesting tract and collecting is thus abundantly facilitated. This rich tropical vegetation however did not furnish as many parasitic fungi as some other districts, though a fair amount of saprophytic species were noticed. The situation of Livingston, 12 miles north of Puerto Barrios, at the mouth of Rio Dulce, is wholly unlike the latter. The town is built on a rocky bluff 50 to 60 feet high fringed with shrubs and trees — the Cocconut-palm everywhere planted in the low country being a conspicuous feature of the landscape. A small area outside of the town has been cleared — which affords opportunity for "weeds" — native and introduced — and thus a marked variation is noticeable from the dense jungle of tree-ferns, palms, hosts of *Melastomaceae*, climbing *Panicums* and numerous other interesting forms most of which are hosts to parasitic fungi.

TENADORES AND LOS AMATES.

At the point where the railroad touches the Rio Motagua the little village of Tenadores is situated in the midst of extensive Banana fields. Small clearings around have been made. The river is fringed with great areas of tall canes and grasses. The great Monaca Palm is everywhere conspicuous as also is the *Ceiba* [pron. say-cé-bah] the latter in many cases being of enormous size. A somewhat better mycological field for the collector is offered at Los Amates, a town on the Rio Motagua about 60 miles from the Port. The altitude is 160 feet; the river valley is wide and covered with a varied growth of plants. Northward a few miles the low mountain range of Sierra del Mico is encountered. Somewhat varied edaphic conditions are afforded and the region is a very rich one for the collector. A short distance above the town are some extensive pampas regions and further up the river are denuded forest areas formerly covered with Pines (*Pinus caribaea*) now turned into lumber and exported.

GUALAN AND ZACAPA.

On the Rio Motagua 80 miles from the Port (Barrios) is situated the Indian city of Gualán at which point the central semi-arid or desert region begins. Cactus trees of the *Cereus*, *Opuntia* and *Peireskia* types occur, but not in great abundance. Numerous other xerophytic plants occur in this region, which therefore is extremely interesting and rich in parasitic fungi. It is just beyond the very moist low country. The altitude is 420 feet. The valley proper varies from one mile to three or four times that width. The Sierra de las Minas range lies immediately to the north and hills or low mountains flank the southern side. At present this is the end of the first division of the Northern Rail-

road (Ferro-carril del Norte), and the location of the shops and offices—all of which however are to be moved immediately to Zacapa a town 20 miles farther up the river situated in the wider valley of the Zacapa River, a branch of the Motagua. Before passing, it is a pleasure to acknowledg the kindly assistance in our work afforded by Mr. G. F. Williamson the Manager of the Railroad. In his absence his first assistant Mr. Fox was equally polite and obliging to us. At Zacapa the vegetation has a more pronounced xerophytic type—the tree Cacti are more numerous, and the great wastes of Acacia and Mimosa bushes are impressive. Grasses are very numerous—in wet places tall forms occur, but over the dry areas short-stemmed species form a sparse layer, yet almost dense enough to be called sod. The mountains become gradually higher more sharply limiting the narrowing valley till El Rancho is reached.

EL RANCHO.

This place for years the terminus of the Northern Railroad, 130 miles from Puerto Barrios and almost half-way across the continent in an E. N. E. and W. S. W. line, is an interesting region to the traveler as well as to the botanist. The Sierra de las Minas immediately to the north lifts its peaks into the clouds, attaining an altitude of about 3,000 feet. The mountains to the south of the narrow valley are of insignificant height. The great river Motagua even at this dry winter season demands care from those who ford its waters. But the chief charm is in the peculiar vegetation—the numerous *Peireskia* (Cacti) with leaves still attached or wholly discarded, in all cases loaded with the pomiform fruits suggesting at a short distance a real apple orchard; the giant *Cereus* trees and the equally abundant and striking *Opuntias* and their near relatives; the *Ficus* trees; the common Bastard Mahogany, the real Mahogany, the hosts of leguminosae and other thorny trees,— and yet other xerophytic forms too numerous to mention suggests the field afforded the exploring mycologist, making the sojourn at once a place extremely interesting and equally profitable. This semi-desert region extends still farther up the Motagua and again north westward to Salamá into regions to be explored on a future trip. From this place our route took a west southwesterly course passing through Sanarate, an important town of considerable altitude, across the rugged San Antonio Mountain by a rocky trail, by way of Agua Caliente, to the city of Guatemala.

GUATEMALA CITY.

At an altitude of about 5,000 feet the city of Guatamala is situated on a mesa surrounded by deep barrancas beyond which are mountains whose summits are 500 to 1,000 feet above the

plateau. It is a beautiful site but no detailed account of the vegetation of the region need be given. That of the higher mountains is somewhat peculiar. Forests of pines are not uncommon. Intermediate between these but at very high altitudes the oaks are very numerous. The *Compositae*, the herbaceous, the half-shrubby, the fruticose and arborescent forms, are abundant here as throughout the Republic. Labiatae are perhaps more abundant than in the very low country. The *Leguminosae* are conspicuous by their abundance and in this respect rival the *Compositae*. The arboreous species are common. Rusts were everywhere in evidence, and in fact the parasitic species of all groups of fungi were numerously represented. In the rainy season the saprophytic forms could doubtless be collected in great abundance.

PACIFIC COAST REGION.

The Central Railroad leads by a serpentine route 74 miles from Guatemala City to San José, a Pacific port 40 or 50 miles distant, the descent in this short distance being about 5,000 feet. Through the thoughtful courtesy of Mr. D. B. Hodgson, (Gen. Mgr.), and Mr. W. B. Tisdal, (Asst. Mgr.), facilities were kindly offered for transportation, including scientific paraphernalia, along this line and their yet more interesting western branch that parallels the coast at a distance of about 40 miles — this being a finished portion of the Pan-American Railway — traversing an exceedingly rich country at the foot of the Cordilleras, ending at present at the large city of Mazatenango. Still another Company operates a Railroad from the latter city to Ratalhuleu, thence southward to the Pacific Port of Champerico and northward to San Felipe. This whole region is extremely warm; the vegetation is dense and tropical, but very much extended areas have been cleared and now furnish splendid fields for sugar cane. Lagoons border the coast which is fringed as in all tropical regions with the Mangrove. The whole country is a paradise for the botanist, and fungi are everywhere plentiful enough. Large collections for future study were made at Escuintla, Santa Lucia, Patalúl and Mazatenango. From this region two trips were made northward to the crest of the Cordilleras to several interesting points as follows.

QUEZALTENANGO.

From San Felipe in the northern part of the Department of Ratalhuleu, altitude 1,050 feet, a trip was made mule-back, between 20 and 30 miles to Quezaltenango in the Department of like name, altitude 8,000 feet. For a large part of the way the vegetation was tropical and the region was enchanting. Splendid coffee plantations were passed, and higher up vegetation, characteristic of mountainous regions, was encountered. Abund-

ant collections were made. The trip to Lake Atitlán was made from Patalúl which proved to be a charming repetition in the main of the route before described to Quezaltenango. This may be described in connection with another considerable mountain-lake, namely Amatitlán.

LAKES ATITLAN AND AMATITLAN.

Besides the great Lake Izabal near the east coast in Department of same name and Lake San André or Petén in the middle of the Department of El Petén — neither included in the itinerary of 1905 and 1906 — the only other very large bodies of water in the interior of Guatemala are the mountain lakes of Amatitlán, in the Department of same name, and Atitlán, in the Department of Solalá. These lakes are 7 or 8 miles in length: Atitlán is 6 or 7 miles wide, but Amatitlán has a width of only one mile near the middle and about 3 miles exclusive of this narrow neck. They are alike in having for the most part walls of rather steep sloping mountains — yet the flat area on the north side of Amatitlán is very great — being the debris of ages brought down by the drainage from the north, finding its way into this mountain-hemmed basin mainly through the river emptying in the Lake at the middle and now greatly narrowed part. There is no visible outlet to Lake Atitlán: Río Michatoya drains Lake Amatitlán Pacific-ward. This lake is only about one hundred feet deep, but some parts of Lake Atitlán are over 1,000 feet in depth. Much time was spent on Lake Amatitlán to which then the following more particularly applies. The marked xerophytic character of the shore vegetation, as well as that of the slopes, was striking. Cacti were rather abundant; *Acaciae* and *Mimosae* were common; the *Agaves* were not rare; and hosts of *Compositae*, *Leguminosae*, *Labiatae*, etc., were present. One species of fleshy *Asclepias* grew on the shore; some species of *Ficus* were common; a giant *Equisetum* was encountered; groves of *Salix humboldtiana* were conspicuous; and epiphytic orchids, cacti, and bromeliads abounded. The parasitic fungi in due quantity were at hand and later reports will show that many species were here collected.

THE VOLCANOES AGUA, ATITLAN AND SANTA MARIA.

Collections were made on three of the very high volcanoes, namely Agua, Atitlán and Santa Maria, also on Cerro Quemado and the lower part of Acatenango. The altitudes of the first three are 12,300, 11,500 and 11,300 feet respectively. Agua, situated in the Department Sacatepéquez, is clothed with vegetation to the very apex and on the interior of the rather small crater — coarse grasses, some shrubs and a few stunted trees. A heavy belt of timber encircles the cone reaching a line within

perhaps 2,000 feet of the apex. Toward the base it has been denuded of the original vegetation and converted into farms. Clouds and mists keep the upper portion bathed in moisture and the vegetation is very luxuriant except near the top. The entire area of its flanks furnishes excellent opportunity for the botanical collector. The volcano Atitlán is in the Department of Solalá immediately south of Lake Atitlán, and in general appearance is much like Agua. It is not however clothed with vegetation to the extreme apex — the volcanic ash preventing plants from getting a foothold there. The forest covering which is very dense, beginning immediately below the line of loose material, has not been disturbed except very near the base. The volcano Santa Maria in the Department of Quezaltenango is likewise clothed with forest vegetation, which reaches the summit. The eruption that took place in 1902 completely destroyed the vegetation on the south and southwest side where a new crater of immense size was formed. Many parasitic fungi were obtained on these volcanoes, especially on the first named in the list, yet the collections must be materially augmented by future trips before a just estimate can be made as to abundance, distribution and character.

ACKNOWLEDGEMENTS.

By no means so much could have been accomplished without the cordial assistance and encouragement of many residents and citizens of that Republic. First of all thanks are due the officers of the Northern Railroad (Ferro-carril del Norte), and of the Central Railroad (Ferro-carril Central de Guatemala), for courtesies, previously mentioned in this article. The American Minister Plenipotentiary Mr. Combs, the Consul General Mr. Winslow, the Vice Consul Mr. Owen, and Rev. W. B. Allison a resident missionary, also assisted by kindly advice; the pleasures of the trip were greatly enhanced by the courteous and cordial reception by their families. It is a pleasure also to acknowledge the uniform courtesy of the officers of the Republic, and their interest in our explorations, which is at the same time a reflection of the liberal and advanced policy, and deep interest in scientific and industrial advancement, on the part of the President of Guatemala, Manuel Estrada Cabrera.

OCCURRENCE OF LASIODIPLODIA ON THEOBROMA CACAO AND MANGIFERA INDICA.

VERA K. CHARLES.

In the spring of the present year a consignment of diseased *Theobroma* material, which included wood and fruit was sent

to the Department of Agriculture from Brazil for examination as to the cause of the disease. Unfortunately, no written description accompanied the specimens and as they were in alcohol there was no opportunity to trace the development of the disease to determine whether the disease on the pods was the same as that which produced the general abnormal branching of the twigs. *Colletotrichum* was definitely determined as present on the pods, but it was not in sufficient quantity to be the sole cause of the trouble. We inferred this only from the material which we had for examination, but of course it is possible that our limited amount of material was not typical of the disease in its natural place of occurrence. The beans were one mass of brown, many septate, knotted mycelia. As these beans were also in a preservative fluid no cultures could be started which would lead to the identification of this sterile mycelium. A second consignment of specimens of diseased *Theobroma cacao* consisting of pods and wood was received in August of this year from San Domingo. These pods showed the presence in great quantity of mycelium, similar to that just described, but in this case the fungus was fruiting and definitely identified as belonging to the genus *Lasiodiplodia*.

About three months ago two specimens of the fruit of *Mangifera indica* were sent to this Office by one of our plant introducers, who procured them from a local fruit stand, which had probably received them from Florida. Although badly rotted the fungus was isolated and proved to be *Lasiodiplodia*. Several transfers were made but all cultures, even the first, were remarkably pure.

The question whether this fungus is *Lasiodiplodia tubericola* E. & E. and not a new species, is yet to be determined. To all present appearances it is the same, but a series of inoculation experiments are in progress to determine if this may be a physiological species. Although the effect produced on these two hosts is not that of putrefaction, which is characteristic of this species, we are inclined to believe that the length of time which elapsed before the material received our attention and the unusual condition to which it was subjected during that time, may be responsible for the somewhat softened condition of the fruits.

That this fungus may be connected with the Witches' Broom disease or "putrefaction" disease, as called by cacao planters, we cannot say until we complete our cultural experiments, and have more material for our examination together with field observations.

Bureau of Plant Industry,
U. S. Department of Agriculture.

A NEW METHOD OF MOUNTING FUNGI GROWN IN CULTURES FOR THE HERBARIUM.*

GEO. G. HEDGCOCK AND PERLEY SPAULDING.

The writers had occasion recently to mount specimens of some of the smaller fungi which are easily grown on artificial media for the purpose of preserving them for herbarium specimens. This so far as known has never been attempted and no such specimens have ever been seen which were satisfactorily put up for such purposes. All available methods which have been tried were so far as known considered, but none of them seemed to present a good solution of the difficulty. It was accordingly attempted to invent some method which would be easily and cheaply used on as extensive a scale as might be wanted by any one issuing sets of exsiccati, or wishing to have the imperfect fungi represented in an herbarium by pure cultures. It is believed that such a method has been discovered which is not only very satisfactory but is also cheap and easily used on any scale that it may be wished to prepare these fungi.

The fungi are separated and grown in pure cultures in Petri dishes upon a rather stiff agar agar made with some infusion suitable for the normal growth of the fungi. At the proper stage in their growth the plates are divided into square blocks of agar of a suitable size. Each of these blocks is placed right side up upon a stiff cardboard and allowed to dry down. The cardboards may be of almost any description, but it has been found that a good quality of index cards is most convenient for the purpose.

After the agar has become dry the mount is protected by pasting over the agar block a small, square or circular piece of cardboard which has been perforated with a gun-wad cutter, the perforation being of a size necessary to include the mounted block. These squares or circles of cardboard may be made of board of several thicknesses, varying from one to several millimeters, so that in selecting a protector the thickness may be adapted to the height of the filaments in the fungus.

This method of mounting has proven very convenient with specimens of *Stilbum*, *Graphium*, *Ceratostomella*, *Hormodendron* and other similar fungi; it is best, however, to poison the specimen after mounting, by spraying it with a strychnine solution.

Mississippi Valley Laboratory,
July 30, 1906.

*Published by permission of the Secretary of Agriculture.

A NEW SPECIES OF GALERA.

CHARLES H. PECK.

A species of this genus apparently undescribed has been brought to my notice recently of which the following account may be given.

GALERA KELLERMANI Peck sp. nov. — Pileus very thin, sub-ovate or subconic, soon becoming plane or nearly so, striatulate nearly to the center when moist, more or less wavy and persistently striate on the margin when dry, minutely granulose or mealy when young, unpolished when mature, often with a few scattered floccose squamules when young, and sometimes with a few slight fragments of a veil adhering to the margin which appears as if finely notched by the projecting ends of the gills, watery brown when moist, grayish brown when dry, a little darker in the center, taste slight, odor faint, like that of decaying wood; lamellae thin, close, adnate, a delicate cinnamon brown becoming darker with age; stem slender, equal or slightly tapering upward, finely striate, minutely scurfy or mealy at least when young, hollow, white; spores brownish ferruginous with a faint pinkish tint in mass, elliptic, $8-12 \times 6-7 \mu$.

Pileus 2-3 cm. broad; stem 2.5-4 cm. long, 1-2 mm. thick. Gregarious or subcespitose. Ground in a greenhouse, Columbus, Ohio, August, 1906. Number 4494. Dr. W. A. Kellerman.

The distinguishing characters of this species are its broadly expanded or plane grayish brown pileus with its minutely granulose or mealy surface, its persistently striate margin and its very narrow gills becoming brownish with age. The indication of a veil is also unusual.

The species is respectfully dedicated to its discoverer who has kindly sent copious notes, specimens, spore-prints and photograph from which the description has been prepared.

EXPLANATION OF PLATE 89. — *Galera kellermani* Peck. A half tone illustration of several plants. A very young specimen shows the minutely granulose or mealy character of the cap. Fully grown plants are shown and in one case the fragments of a veil are distinctly seen attached to the margin.



GALERA KELLERMANI PECK.

REASONS FOR DESIRING A BETTER CLASSIFICATION OF THE UREDINALES.*

BY J. C. ARTHUR.

There are two especially prominent reasons for the consistent naming of the species of rusts, and for other plants as well. One is to be able to designate each particular kind as desired by using an authoritative name, and the other is to indicate the relationship which that kind holds to other kinds according to its recognized place in a natural system. If we examine the classification of the Uredinales now in use from these two standpoints, passing by for the present other points of view, many defects will be apparent, even to the verge of thorough confusion.

The methods by which an authoritative name may be selected, when more than one has been in use, have been much discussed of late and need not be taken up here. When the general rules of nomenclature are applied to the Uredinales, however, a complication arises in many cases due to the fact that some of the species possess partly or wholly independent phases of existence during their life cycle; and these different phases have such nearly equally prominent characteristics that they were at first inevitably placed in separate genera, as if they were autonomous organisms. When the different forms of a species are collected under one name, it would seem natural and logical that the several appellations previously in use for the different phases of the species should have consideration. Yet the view, that only names applied to the last or telial stage of the species are worthy of recognition, is held by many uredinologists. A discussion of this topic can not be taken up here, but it may be worth while to state the opinion of the writer that when the real significance of the several life phases of the rusts is better appreciated the opposition to a logical treatment of the Uredinales in conformity with the treatment of other plants will largely, if not wholly disappear. In support of this opinion let it be noted that those who would discredit the nomenclatorial standing of the aecial phase are in the anomalous position of ignoring the sexual stage of the species, if we are to accept recent cytological studies, which in the case of other plants is considered the pivotal basis of classification.

In passing to the second part of the subject it is worth bearing in mind that the desire for a stable nomenclature should never stand in the way of improvement in classification by segregation of genera to bring out more clearly the relationship of

* Read before the American Mycological Society, New Orleans Meeting, January 1, 1906.

groups of species. One of the impediments at the present time to an understanding of the interrelationship of rusts lies in the lack of reasonable segregation of genera. In support of this statement one need only recall the fact that the genus *Puccinia* as now constituted contains more than half of all known species of rusts, and what may not be so well known, that within this category are contained groups of the most diverse forms and affinities. To be assigned to this genus requires only that the rust shall possess a two-celled, stalked teliospore. No consideration need be given to the nature of the spore wall, whether homogeneous or differentiated into well marked layers, or to the number and position of the germ pores in each cell, or to the question of simple or compound stalks. It is also unnecessary to ask whether the life cycle of the rust possesses pycnia, aecia and uredinia, in addition to the telia, or whether one or more of these is wanting, or what may be the origin of sori in any or all of these four stages in relation to the substratum. Yet all these characters, and some others, should be kept in mind to rightly appreciate the validity of a genus in the *Uredinales*. In short the genus *Puccinia* is founded upon what is essentially a single character, which can not be shown to be correlated with other characters going to form a natural grouping of closely related organisms. A very similar genus is that of *Uromyces*, which differs from *Puccinia* apparently only in possessing one-celled instead of two-celled teliospores, and all that has been said of *Puccinia* applies with equal force to *Uromyces*. These two genera are fine examples of the heterogeneous results of founding genera on a single technical character when it can not be shown to be also a representative character.

Let us now turn from the negative to the positive side of the discussion, and instead of insisting upon the artificial construction of the genera *Puccinia* and *Uromyces*, let us see what segregation can be made of the species to show more fully their affinities. First of all it will be necessary to study more fully than is usual both spores and sori of all the stages or phases of each species, including the pycnia. Our attention will soon be attracted to the fact that while the pycnia of the majority of species are flask shaped, and arise under the epidermis, some are conical or flat, and arise under the cuticle. We shall further find that these differences are correlated with characters in the other spore forms, especially in the spores and sori of the uredinia and the spores of the telia.

Removing now all species with subcuticular pycnia, and directing attention more particularly to the uredinia of this segregated group, we shall find species in which the urediniospores are distinctly different at apex and base, reminding one of the urediniospores of the genus *Ravenelia*. Correlated characters will be found to set aside a group of genera having be-

side the peculiar urediniospores also teliospores with verrucose, globoid cells and fascicled pedicels, for which *Puccinia Prunispinosae* is a good illustration, and still another group of genera having teliospores borne one or more on free pedicels, and the spores often flattened above and below, for which *Uromyces brevipes*, the rust on *Rhus*, is representative.

Having removed these groups of genera related to *Ravenelia* we shall still have left species with urediniospores of the usual appearance, but with sori surrounded by numerous paraphyses. Among these we shall find a group of genera with peculiarly tuberculate teliospores having lateral germ pores, clearly related to *Phragmidium*, and still another group of genera in which the teliospores possess a hygroscopic layer between the outer and inner parts of the wall, clearly related to *Uropyxis*. This latter group is still further separable into genera with lateral pores like *Uropyxis*, or with apical pores like species of *Puccinia* having subepidermal pycnia.

Having now removed a large number of species from the parallel genera *Puccinia* and *Uromyces*, and segregated them into groups of genera related variously to *Ravenelia*, *Phragmidium* and *Uropyxis*, let us look at what remain, all of which have flask-shaped pycnia arising from beneath the epidermis. We can easily discover here two groups of genera, one having indefinitely extended aecia and colorless teliospores, germinating in the sorus as a rule, of which *Puccinia evadens* found on *Baccharis* is a representative, and the group of genera having definite aecia and colored teliospores, embracing all that is left of the genera *Puccinia* and *Uromyces*, of which most grass and sedge rusts, *Puccinia Helianthi*, etc., are representatives.

Having now segregated the species usually placed under *Puccinia* and *Uromyces* into seven groups of genera with affinities extending through the whole length of the *Pucciniaceae*, let us resolve these several groups into their respective genera. In order to do this it is necessary to take a glance at the probable scope of the influences which have determined the development of the genera in the *Uredinales*. It seems highly probable that in general the influences which have acted to limit and shape the species and also the genera of higher plants, such as temperature, humidity, elevation, natural barriers, succession of seasons, etc., have also had similar effects upon the species of the rusts. In addition to these a set of influences have been brought to bear by virtue of their strict parasitism, which are scarcely to be paralleled in any other group of plants. This is shown in limiting the species to certain orders, genera, or even species of hosts. How far the host has reacted upon the rust to modify its form and structure is difficult to decide, but that such action has occurred there seems to be no occasion for doubt. This

influence of the substratum in the case of parasitic plants, however, is doubtless largely comparable with the influence of the substratum in non-parasitic plants, only more pronounced.

But there is an influence which has helped to delimit both species and genera among the *Uredinales*, not found apparently in any other group of plants. This influence is difficult to define, but it is manifested in directing the phylogenic course of development within the group, by which the life-cycle is shortened.

There appears to be ample justification in assuming that at a comparatively early period in the evolution of the *Uredinales* all the rusts possessed four forms of spore-structures, pycnia, aecia, uredinia and telia. We need not go back of this period to inquire how they came to have the four kinds of spores, as it does not affect in the least our present contention. But during the universally four-spored condition for the order, some influence began to affect the relative production of the several spore-forms, which eventuated in the suppression of one or more of these from certain species or group of species. As a result of this influence we find that the *Uredinales* of the present day consist of groups of species in the several divisions of the order, generally regarded as genera, which in many cases can be again separated into at least four groups of species, according as they possess all spore-forms, all but aecia, all but uredinia, or finally only telia. In each of these four groups the pycnia are generally present, but in some species of the last named group even pycnia may fail.

Among the melampsoraceous rusts there has been an unpremeditated, and largely unrecognized tendency to regard the absence of certain spore-forms as among valid generic characters, but among the pucciniaceous rusts such a tendency is distinctly opposed. That this is, however, a generic character of importance among rusts generally, I not only venture to affirm, but believe that it will in many cases be found to be associated with other characters further indicating true generic grouping. It is among the genuine *Pucciniae* after other genera have been removed as indicated above, that this character for separating genera finds its most uniform and conspicuous application. This is in fact exactly what should be expected, for this group undoubtedly represents the highest and most complex development of the *Uredinales*.

In advocating the importance of recognizing the life-cycle in drawing generic distinctions it is well to forestall misapprehension by pointing out that the usual absence of a spore-form does not necessarily constitute an abbreviated life-cycle. Many species of rusts in northern regions especially have the habit of propagating themselves from year to year largely by the urediniospores which survive the winter, either as continuously pro-

duced spores on living leaves, as in the case of *Puccinia Poarum* and *P. rubigo-vera*, or as stray spores no longer connected with a living host, as in *P. Sorghi* and *P. graminis*. In such cases the uredinia are usually followed each season by a greater or less development of telia, which serve little or no purpose in the propagation of the species, as the proper host plants for the aecia may be rare or absent. Such a condition explains the great prevalence of such species as *Coleosporium Solidaginis* and *Melampsora Medusae* when suitable coniferous hosts do not occur within hundreds of miles, and their aecia are rarely or never collected. Again in warmer regions a species is maintained through its urediniospores alone, the other spore-forms rarely or never being seen. But these are not instances of abbreviated life-cycle within the meaning here implied. They are a form of extended conidial propagation, the full life-cycle, whenever circumstances permit it to be completed, showing all spore-forms. In other cases the completed life-cycle may show less than the full number of spore-forms, as in *Puccinia umbelliferarum*, where the aecia are wanting, etc.

While every genus heading a large section of the *Uredinales*, like *Coleosporium*, *Melampsora*, *Cronartium*, *Ravenelia*, *Phragmidium*, etc., is theoretically capable of division into four genera in accordance with the extent of the life-cycle, yet forms are not known in all cases to permit of such a division, and no uniformity exists in regard to the proportional number of species falling into each of the newly delimited genera. Moreover, in many cases other characters demand recognition, and altogether it will be found that the admission of the life-cycle as a generic character does not result in a mathematical regularity of genera, throughout the order, as at first sight might be assumed.

If we require that a genus should represent as fully as possible a group of organisms giving evidence of having been derived from the same ancestors, and therefore with species more closely related genetically to one another than to those of any other genus, it becomes necessary to explain a well known parallelism, brought to our attention by Fischer of Switzerland. He showed that in many cases the teliospores of a species having an extremely abbreviated life-cycle, e. g. *Puccinia Leucanthemi*, closely resemble those of an autoecious species, e. g. *P. Aecidii-Leucanthemi*, in which the host of its aecia is the same or practically so as the host of the abbreviated species. Tranzschel has successfully applied this rule of parallelism in predicting the host of the unrecognized aecia in certain heteroecious species. In such cases of parallelism there can be no doubt that the forms in question have truly descended from a common ancestor, but dating a long way back, even to the early days when all the rusts had four spore-forms. Searching for an adequate

cause to account for the breaking up of a primitive species into two or more modern parallel species with different lengths of life-cycle, I think it may be found in the augmented influence of parasitism. In the primitive times the rusts were doubtless but weakly parasitic, but in their onward development parasitism with its restricting and reducing effects became constantly more pronounced. To develop the theory here would extend this article beyond reasonable limits, but it is believed to fully account for the observed parallelism. It also accounts for the fact that essentially the same shortening of the life-cycle occurs or may be looked for in every group of the *Uredinales*, but is most extensive in the groups showing the greatest differentiation and highest development. And finally it does not militate in the opinion of the writer against the validity of genera whose ultimate distinction is that of the length of the life-cycle, but lends important aid in tracing their relationships.

The arguments in this article have in the main been directed against or received their support from the old-time genus *Puccinia* and its consort *Uromyces*, believing that whatever would prove acceptable to systematists in this connection can readily be extended to the whole order of the *Uredinales*. I have thus presented some of the reasons which appeal to me for desiring a better classification of the *Uredinales*, believing that when obtained it will promote the study of the order and facilitate an understanding of relationships.

NORTH AMERICAN SPECIES OF LEPIOTA.

A. P. MORGAN.

The name *LEPIOTA* was given by Persoon to the first section of his genus *Agaricus*; it had a wider application in the "Synopsis" than is assigned to it in the genus of the same name at the present time. Fries in the "Systema" made of the term *Lepiota* a tribal designation, restricting it to the species of *Agaricus* about as understood at present. The species thus included are well worthy of generic distinction.

Fries in the *Hymenomycetes Europaei* enumerates 45 species of *Lepiota*. Since the publication of this volume (1874) European mycologists have increased the number to more than 100. The region most prolific in species of this genus so far discovered is the island of Ceylon where upward of 70 species were enumerated and described by Berkeley and Broome. Saccardo in the different volumes of the *Sylloge Fungorum* enumerates more than 300 species.

Schweinitz in the *North American Fungi* (1834) gives a list of 5 species of *Lepiota*. In Lea's *Catalogue* (1849) there is a

list of 4 species. Sprague in one of his papers (1858) enumerates 5 species. The Amherst Catalogue (1875) contains 11 species. The Pacific Coast Catalogue (1850) 5 species. Comprehensive and critical work upon the Fungi of North America began with the publication (in 1870) of the 23d Report of the State Botanist of New York, Charles H. Peck. The series of Reports upon the Fungi of the State of New York issued annually from that year up to the present suggests the extent and richness of the Northern Fungal Flora.

There has been enumerated up to this time near 80 species of North American *Lepiotas*, plainly an inadequate number for the vast territory considered. Peck's monograph of the genus in the 35th New York Report (1882), appears to be still about all we have to work with; it describes only 18 species! It is therefore suggested that we endeavor to marshall the species known and described up to date into some sort of order that we may, first, make a more critical study of them, and secondly, bring to light such species as are not yet recognized. For this purpose we are applying to North American species a scheme of arrangement which we make use of to refer to the numerous species of *Lepiota* described in the *Sylloge Fungorum*.

LEPIOTA Persoon, Synopsis 1801; Fries, Syst. Myc. 1821. Hym. Eur. 1874; Saccardo, Sylloge Fungorum, V, IX, XI, XIV, XVI, XVII.

Pileus soft fleshy, rather dry; veil marginal. Stipe hollow or fibrous-stuffed, rarely solid, commonly tapering upward from a thickened base; volva none. Lamellae free, approximate or remote, rarely reaching the stipe; spores white, sometimes with a tinge of pink or yellow, in one species bright green.

Agarics varying in size from the largest to very small, growing usually in rich soil, a few species on old decaying wood. The surface of the pileus may be smooth and glabrous, more commonly the dermis is broken up into granules, warts and scales; in a few species the surface is viscid or glutinous. Fries invests the pileus in this genus with a universal veil concrete with the dermis. According to De Bary, Brefeld and others there is but a partial or *marginal veil*. This veil is a membrane joining the margin of the pileus to the surface of the stipe; it continues to grow along with the general growth of the pileus and stipe until the time of the hyponastic upward expansion of the former when it is torn away from the margin of the pileus and is left behind upon the stipe. The mode of development of the partial veil and the manner of its rupture occur in three different ways which are made use of to arrange the species of *Lepiota* into three different sections. These sections are defined in accordance with the views of De Bary as expressed in his Comparative Morphology.

§ 1. ANNULI INFERI. THE VEIL IN THIS SECTION HAS A TWO-FOLD ORIGIN; IT IS A CONTINUATION OF THE OUTERMOST ROW OF CELLS OF THE STIPE WHICH HAS GROWN FOR SOME TIME WITH THE STIPE BY INTERCALARY GROWTH AND PASSES INTO THE MARGIN OF THE PILEUS; AND CONVERSELY IT IS A CONTINUATION OF THE OUTERMOST HYPHAE OF THE PILEUS PASSING INTO THE SURFACE OF THE STIPE. THE SEPARATION TAKES PLACE AT THE MARGIN OF THE PILEUS, THE VEIL REMAINS ATTACHED TO THE STIPE AS A RING OR AS A SHEATH RUNNING DOWN ITS SURFACE OR SOMETIMES PORTIONS OF IT FORM A FRINGE OR APPENDAGE TO THE MARGIN OF THE PILEUS.

I. MESOMORPHAE. *Dermis of the pileus entire, the surface of both pileus and stipe smooth and glabrous; the veil annulate, often evanescent.*

A tribe of small Agarics. More than a dozen species are enumerated in the Sylloge Fungorum.

1. LEPIOTA MESOMORPHA Bulliard, Herb. Fr. 1791.

Pileus a little fleshy, campanulate then expanded, dry, smooth and glabrous, whitish, ochraceous or yellowish. Stipe short, slender, hollow, smooth and glabrous, concolorous with the pileus; the annulus more or less persistent. Lamellae rather narrow, white, free, approximate; spores elliptic-ovoid, 4.5×3 mic.

Growing on the ground in woods. Preston, O. Pileus about 2 cm. in diameter, the stipe 5-7 cm. long and about 2 mm. thick.

2. LEPIOTA RUFIPES Morgan sp. nov.

Pileus a little fleshy, convex, smooth and glabrous, white. Stipe slender, smooth and glabrous, rufescent, paler at the summit; the annulus evanescent. Lamellae broad, close, white, free, approximate; spores oblong, 4.5×3 mic.

Growing on the ground in woods among old leaves; Preston, O. Pileus about a centimeter in diameter, the stipe 2-3 cm. long.

II. EUCONIATI. *Dermis of the pileus not lacerate, but the surface pruinose, finely pulverulent or minutely furfuraceous; the investment of the stipe usually similar to that of the pileus; the veil often appendiculate.*

These are mostly small Agarics easily recognized by the powdery surface of the pileus.

A. STIPE GLABROUS.

3. LEPIOTA CRISTATELLA Peck, 31st N. Y. Rep. 1878.

Pileus thin, convex, subumbonate, minutely mealy especially on the margin, white, the disk slightly tinged with pink; the veil lacerate, leaving fragments on the margin or evanescent.

Stipe slender, hollow, glabrous, whitish. Lamellae close, rounded behind, free, white; spores subelliptic, 5 mic. long.

Growing in mossy places in the woods. New York. *Peck*. Pileus 4-8 mm. in diameter, the stipe 2-3 cm. long and about 1 mm. thick.

B. STIPE PULVERULENT OR MINUTELY FURFURACEOUS.

4. *LEPIOTA CHEIMONOCEPS* B. & C. *Fungi* Cub. 1867.

Snow-white. Pileus thin, pulverulent; the margin here and there appendiculate. Stipe thickened downward, furfuraceous; the annulus lacerate. Lamellae rather broad, free, remote; spores subglobose, 8×6 mic.

Growing on logs. Cuba. *Wright*. Pileus 2-4 cm. in diameter, the stipe 2-3 cm. long. A very pretty species.

5. *LEPIOTA NOSCITATA* Britzelmayr, *Derm. et Mel. App.*

Pileus ovoid-conic then expanded, subumbonate, white, rufescent in the center, glabrous or very minutely flocculose; the margin faintly striate. Stipe elongated, hollow, tapering upward, very minutely flocculose, rufescent; the annulus minutely flocculose, evanescent. Lamellae white, rather broad, free; spores ovoid-oblong, $3.5-4.5 \times 3$ mic.

Growing in rich soil in woods, Preston, O. Pileus 2-3 cm. in diameter, the stipe 4-6 cm. long and 2-3 mm. thick.

6. *LEPIOTA SEMINUDA* Lasch, *Linnaea* III. 1828.

Pileus very thin, campanulate then expanded, umbonate, floccose-mealy, at length naked, whitish or pinkish; the margin appendiculate by the torn veil. Stipe hollow, slender, farinaceous. Lamellae rather narrow, white, reaching the stipe; spores ovoid, $3-4 \times 2.5$ mic.

Growing on the ground in woods. Preston, O. Pileus 2-3 cm. in diameter, the stipe 3-5 cm. long and about 2 mm. thick.

7. *LEPIOTA PARVANULATA* Lasch, *Linnaea* III, 1828.

Pileus a little fleshy, ovoid then campanulate and explanate, subumbonate, even, slightly silky or subpruinata, white with a tinge of ochre in drying. Stipe subequal, slender, hollow, white, below the annulus fibrillose. Lamellae broad, white, close, free, approximate; spores elliptic, $3-4 \times 2.5$ mic.

Growing on the ground in grassy places. Preston, O. Pileus about a centimeter in diameter, the stipe 2-3 cm. long and about 2 mm. thick.

8. *LEPIOTA CYANOZONATA* Longyear, 3 *Rep. Mich. Ac. Sci.* 1901.

Pileus a little fleshy, ovoid then campanulate and expanded, subumbonate, minutely fibrillose when young, soon glabrous, creamy or pinkish white with a narrow zone of light blue near the margin; the veil delicate, fibrous, evanescent. Stipe nearly equal, fistulose, whitish, minutely scaly, attached by an abundant strigose mycelium. Lamellae rather broad, whitish, free, approximate; spores subglobose, with a minute apiculus, 6-8 mic.

Growing on decaying sticks on the ground in woods; Michigan. *Longyear*. Pileus 1-2 cm. in diameter, the stipe 2-3 cm. long and about 2 mm. thick. The whole plant becomes brownish when bruised and in drying. "Its striking feature is the delicate blue marginal zone which is suggestive of the specific name."

9. *LEPIOTA PURPUREOCONIA* Atkinson, *Journal Mycol.* 1902.

Pileus thin, convex, the surface covered with a purplish powder; the marginal veil consisting of the same powdery substance. Stipe thick, solid, whitish within, below the annulus covered by the same purplish powder as the pileus. Lamellae broad, rather distant, white or yellowish, free, approximate; spores elliptic, 8-10 x 3-4 mic.

Growing on the ground in woods; New York. *Atkinson*. Pileus 1-2 cm. in diameter, the stipe 4-5 cm. long and 3-4 mm. in thickness.

10. *LEPIOTA ECITODORA* Atkinson, *Journal Mycol.* 1902.

Pileus thin, convex, pale lavender, minutely scaly or pruinose; the veil powdery and evanescent. Stipe tapering downward, white and pruinose above, dark brown to blackish below. Lamellae narrow, rounded behind, free, yellowish; spores cylindrical, 9-11 x 2.0-2.5 mic.

Growing on the ground in woods. New York. *Atkinson*. Pileus 2 cm. in diameter, the stipe 4-5 cm. long and 2-3 mm. thick. "Odor foetid resembling that of *Eciton* ants."

11. *LEPIOTA PULVERACEA* Peck, 54th N. Y. Rep. 1900.

Pileus convex then expanded, pulverulent or minutely granulose, whitish or fulvescent; the veil evanescent. Stipe thick, hollow, granulose or squamulose below the annulus and colored as the pileus. Lamellae white or yellowish, adnexed; spores oval 4 x 3 mic.

Growing in woods on prostrate trunks of Spruce trees. New York. *Peck*. Pileus 2-3 cm. in diameter, the stipe 3-5 cm. long and 3-4 mm. in thickness.

12. *LEPIOTA PUSILLOMYCES* Peck, 28th N. Y. Rep. 1875.

Pileus ovoid then campanulate and expanded, subumbonate,

whitish or dusky, flocculose-pulverulent; the margin appendiculate by the lacerate veil. Stipe slender, nearly equal, fibrous-stuffed, rufescent beneath the white pulverulence. Lamellae very broad, white, free, approximate; spores elliptic-oblong, 4.5×3 mic.

Growing in rich soil among old leaves in woods. New York. *Peck*. Plentiful about Preston, O. Pileus 10-15 mm. in diameter, the stipe 2-4 cm. long and 1-2 mm. thick. The pulverulence consists of thin-walled globular cells.

(To be continued.)

DESCRIPTIVE SYNOPSSES OF MORGAN'S NORTH AMERICAN SPECIES OF MARASMUS.*

A. P. MORGAN.

MARASMIUS FRIES. GEN. HYM. 1836.

Fungi tough and flexible, drying up and more or less persistent, not putrescent, reviving when moistened. Hymenophore continuous with the stipe but heterogenous, descending into the trama; veil none. Stipe cartilaginous or horny. Lamellae tough and flexible, subdistant, the edge acute and entire; spores white.

Agarics small or minute, growing for the most part upon wood or among the old leaves in woods.

§ 1. COLLYBIA. — PILEUS TOUGH-FLESHY AT LENGTH SUBCORIACEOUS, COMMONLY SULCATE OR RUGULOSE, THE MARGIN AT FIRST INVOLUTE. STIPE SUBCARTILAGINOUS. LAMELLAE ADNATE OR NEARLY FREE.

I. SCORTEI. *Stipe solid or medullate-stuffed, then hollow, fibrous within, externally a detersile villosity clothing the cartilaginous cuticle. Lamellae seceding-free.*

A. STIPE WOOLLY OR STRIGOSE AT THE BASE.

a. *Lamellae subdistant. 1-7. [Species Numbers.]*

b. *Lamellae rather close. 8-14.*

B. STIPE NAKED AT THE BASE OFTEN COMPOSED OF TWISTED FIBRES. 15-18.

II. TERGINI. *Stipe rooting, definitely tubular, not fibrous, but manifestly cartilaginous. Lamellae seceding-free. Pileus thinner than those of the former, hygrophanous*

* This should have immediately followed the article to which it pertains — these synoptic descriptions serving well for a key to the species. As a separate it can be placed with the separate of the monograph. — EDITOR.]

A. STIPE WOOLLY BELOW OR AT THE BASE, GLABROUS ABOVE.

- a. *Pileus even or only rugulose.* 19-22.
- b. *Pileus striate or plicate-sulcate.* 23-26.

B. STIPE, AT LEAST WHEN DRY, EVERYWHERE PRUINATE-VELVETY.

- a. *Pileus even or only rugulose.* 27-32.
- b. *Pileus striate or plicate-sulcate.* 33-37.

III. STYLOBATAE. *Pileus convex-involute, then plane and depressed. Stipe cartilaginous without a root, dilated at the base into a circular disk or floccose tubercle. Lamellae adnate. Growing on old wood, branchlets, sticks, etc.*

A. STIPE GLABROUS.

- a. *Lamellae colored.* 38-41.
- b. *Lamellae white or pallid.* 42-44.

B. STIPE VELVETY OR PRUINOSE.

- a. *Lamellae colored.* 45-46.
- b. *Lamellae white or pallid.* 47-51.

IV. CALOPODES. *Pileus convex-involute, then plane, and depressed. Stipe short, insititious (i. e. ingrafted, the mycelium innate and not visible). Lamellae adnate. Growing on old wood, trunks, branches, etc.*

A. STIPE GLABROUS.

- a. *Lamellae colored.* 52-54.
- b. *Lamellae white or pallid.*
 - á. *Pileus colored.* 55-58.
 - b'. *Pileus white or pallid.* 59-60.

B. STIPE VELVETY OR PRUINATE.

- a. *Lamellae colored.* 61-62.
- b. *Lamellae white or pallid.*
 - á. *Pileus colored.* 63-66.
 - b' *Pileus white or pallid.*
 - a''. *Stipe colored.* 67-69.
 - b''. *Stipe white or pallid.* 70-74.

§ 2. MYCENA. *PILEUS FROM SUB-CARNOSE TO MEMBRANACEOUS, CONVEX OR CAMPANULATE, THE MARGIN AT FIRST STRAIGHT AND APPRESSED. STIPE CARTILAGINOUS, TOUGH, DRY, FISTULOUS. LAMELLAE FREE OR ADNEXED, NOT DECURRENT.*

I. LONGIPEDES. *Pileus a little fleshy or submembranaceous, convex or campanulate then expanded. Stipe elongated and rooting among old leaves or in rotten wood. Lamellae free or attached to the stipe.*

A. STIPE GLABROUS. 75-78.

B. STIPE PRUINATE OR VELVETY.

a. *Lamellae free from the stipe.* 79-80.b. *Lamellae attached to the stipe.* 81-85.II. SARMENTOSI. *Stipes arising from an ascending or prostrate common stem.*

A. STIPES GLABROUS. 86-87.

B. STIPES PUBESCENT. 88-89.

III. GLABELLI. *Pileus thin, membranaceous, convex or campanulate, commonly plicate-sulcate. Stipe slender, nearly always glabrous, arising from a floccose tubercle or from a circular disk. Lamellae few or distant, free or adnexed. Growing on old wood, sticks, leaves, etc.*

a. *Lamellae free or subfree.* 90-96.b. *Lamellae attached to the stipe.*a'. *Lamellae colored.* 97-102.b'. *Lamellae white or pallid.* 103-106.

IV. INSITITII. *PILEUS, THIN MEMBRANACEOUS, CONVEX OR CAMPANULATE, USUALLY PLICATE-SULCATE, STIPE FILIFORM, RIGID OR OFTEN FLACCID, MOSTLY GLABROUS, THE BASE INSITITIOUS. LAMELLAE EITHER ATTACHED TO THE STIPE OR FREE; IN THIS CASE THEY ARE ATTACHED TO A COLLAR WHICH ENCIRCLES THE APEX OF THE STIPE AND IS FREE FROM IT.*

Growing commonly on the petioles, midribs and principal veins of old leaves, sometimes on herbaceous stems, etc.

A. STIPE GLABROUS.

a. *Lamellae attached to the stipe.*a. *LAMELLAE COLORED.* 107-108.b'. *LAMELLAE WHITE.*a''. *Pileus colored.* 109-114.b''. *Pileus white or whitish.* 115-120.b. *Lamellae adnate to a free collar.* 121-126.

B. STIPE VELVETY OR PRUINATE.

a. *Pileus colored.* 127-129.b. *Pileus white or whitish.*a'. *Pileus plicate-sulcate.* 130-131.b'. *Pileus even or only rugulose.* 132-134.

§ 3. OMPHALIA. *PILEUS SUBMEMBRANACEOUS; THE STIPE CENTRAL, CARTILAGINOUS, FISTULOSE, SOMEWHAT THICKENED UPWARD; THE LAMELLAE TRULY DECURRENT.*

I. CYATHIFORMES. *Pileus submembranaceous, at length depressed, umbilicate or even infundibuliform.*

A. STIPE GLABROUS. 135-140.

B. STIPE VELVETY OR PRUINATE. 141-143.

II. CLAVIFORMES. *Pileus membranaceous, campanulate or convex, never depressed.*

A. STIPE GLABROUS. 144-145.

B. STIPE VELVETY OR PRUINATE. 146-148.

§ 4. PLEUROTUS. *PILEUS MORE OR LESS IRREGULAR; THE STIPE EXCENTRIC, LATERAL OR WANTING. COMMONLY GROWING ON WOOD.*

A. STIPE EXCENTRIC.

a. *Lamellae colored.* 149-151.

b. *Lamellae white.* 152-153.

B. STIPE LATERAL AND VERY SHORT.

a. *Lamellae colored.* 154-158.

b. *Lamellae white or pallid.* 159-162.

SYNOPSIS TO NORTH AMERICAN SPECIES OF HELIOMYCES.

HELIOMYCES LE'VILLE CHAMP. EXOT. AM. SC. NAT. 1844.

Pileus coriaceous- or membranaceous-tremellose, plicate-sulcate or rugulose. Stipe central, tough, cylindric, fistulose. Lamellae similar in substance to the pileus, the edge acute; spores white.

Small Agarics which are tremelloid when fresh and growing, and when dry have the appearance of Marasmii.

A. STIPE GLABROUS.

a. *Pileus colored from the first.* 1-2.

b. *Pileus at first white.* 3-4.

B. STIPE PRUINOSE. 5-6.

FIELD NOTES ON THE UREDINEAE.

A. O. GARRETT.

The following notes refer to collections of rusts made during the past three years at the head of Big Cottonwood Canyon, about thirty miles from Salt Lake City. The altitudes for the following species range from 8,500 to 9,500 feet.

PUCCINIA SCANDICA Johans.—On Aug. 13 the writer collected an aecidium on young plants of *Epilobium alpinum* which

was determined both by Sydow and Holway as the aecidial stage of *Puccinia epilobii-tetragoni* (DC.) Winter. On the same host but in a different locality *Puccinia scandica* Johans. was collected three days later—the first American collection of this species. The opinion was then formed that the aecidia previously collected were connected with *Puccinia scandica*; and collecting in the same locality the two succeeding seasons has strengthened this opinion for the following reasons: 1, I have never found teleutosori of *Puccinia epilobii-tetragoni* in this region, nor in any other at so high an altitude; 2. The aecidia reach their greatest abundance some time before the teleutospores of *P. scandica* appear; 3. Several specimens were obtained this past season in which both aecidia and teleutosori were found on the same plant, and even on the same leaf. The aecidia have, however, been collected upon hosts upon which the teleutosori of *P. scandica* have not yet been found.

Puccinia caricis-asteris Arth. — Just about dark on August 11, 1905, a collection was made of the aecidia of this species on *Aster adscendens*. The following day another trip was made to the spot for the purpose of finding the teleutosori if possible. The *Aster* plants were growing among a profusion of *Carex festiva*. An *Aster* bearing defunct aecidia was soon found; and the surrounding *Carex* was well infected.

A few days later in another locality the aecidia were found on *Aster Fremonti* with abundant infection on the adjacent *Carex festiva*. A half mile or so away a collection had been made on July 11, of the aecidia on *Aster ciliomarginatus* Rydb. Inspection of the *Carex festiva* in this vicinity showed abundance of teleutosori.

Aecidium monoicum Peck. — A collection of this aecidium on *Arabis Drummondii* being made July 22, 1905, in a locality where there was a large number of the infected hosts, a return was made to the place on August 21 to search for the alternate form. A host plant bearing defunct aecidia was soon located, and the surrounding plants were carefully examined with the result that teleutosori were found on *Trisetum subspicatum*. The two host-plants were intimately associated in growth, and further examination revealed the fact that the *Trisetum* rust was found only on those plants that were immediately adjacent to infected *Arabis* plants. Specimens of the *Trisetum* rust have been sent to Dr. Arthur, and he believes it to be undescribed.

Caecoma confluens (Pers.) Schroeter. — On July 3, 1905, a collection of this rust was made on *Ribes vallicola*. The host-plants grow along the banks of the mountain streams, and the lowermost willow branches frequently touch the *Ribes* bushes as they are swayed by the wind. A collection was made of a *Melampsora* on *Salix* in August, 1903, and again each of the following Augusts. It is the belief of the writer that these two

forms are connected for the following reasons: First, the two hosts are intimately associated in growth. Second, the appearance of the *Caeoma* antedates that of the *Melampsora*. Third, the *Melampsora* occurs on those willow branches low enough to brush against the *Ribes* bushes, or else to be easily infected by the wind. Fourth, during the latter part of the season of 1905, whenever an infected *Salix* was found, search was made for the *Ribes* bush and then for defunct aecidia, almost invariably with successful results. Fifth, the *Salix* goes to the mouth of the Canyon, but the *Ribes* accompany them less than half-way. When the *Ribes* stops, the *Melampsora* also stops.

NOTES FROM MYCOLOGICAL LITERATURE, XX.

W. A. KELLERMAN.

R. A. HARPER'S WORK ON SEXUAL REPRODUCTION and the Organization of the Nucleus in Certain Mildews is Publication No. 37 of the Carnegie Institution of Washington, pp. 1-104. Pl. I-VII, September 1905. Of this interesting and important investigation no brief summary can be made, but the author's conception as to alternation of generations in the higher fungi may be quoted in part. "In the rusts we have sexual reproduction by vegetative fertilization. The fusing cells are perhaps morphologically vegetative offshoots of an egg-cell. . . . In the Basidiomycetes by apogamy sexual cell fusion may have disappeared or we may have vegetative fertilization. . . . In the Ascomycetes we have sexual reproduction and alternation of generations, modified by the adaptation of the spore mother cell as an explosive organ for the dissemination of the spores and as a storage reservoir for the production of resting spores with a large supply of metaplasmic reserve products." . . .

C. L. SHEAR GIVES AN ACCOUNT OF SOME OUT-DOOR INOCULATIONS made in the Spring of 1902, under the title of *Peridermium cerebrum* Peck and *Cronartium quercuum* (Berk.), pp. 89-92, *Journal of Mycology*, Volume 12, May 1906. On May 1st aecidiospores of *Peridermium cerebrum* (from *Pinus virginiana*) were successfully applied to *Quercus coccinea*—uredosori appearing May 12. Shirai has by inoculation proven the connection between *Cronartium giganteum* (Mayr) Tubeuf and what he calls *Cronartium quercuum* (Cooke) Miyabe. Mr. Shear is of the opinion that *Peridermium giganteum* (Mayr) Tubeuf is the same as *P. cerebrum* Peck described many years earlier.

THE NORTH AMERICAN SPECIES OF HELIOMYCES—6 in number—are grouped and diagnosed in the *Journal of Mycology* for

May 1906. These are small Agarics which are tremelloid when fresh and growing, and when dry have the appearance of Marasmi. Prof. Morgan affixes these to his Monograph of Marasmius (published in previous Nos. of the same Journal) to which genus in fact most of the species were originally referred. Both the Marasmius and the Heliomycetes species are indexed together—and also issued as one pamphlet (*Separate*).

IN SCIENCE FOR MAY 25, 1906, CHARLES J. CHAMBERLIN points out that *Mega* as a prefix in such words as megaspore, megasporophyll, megasporocarp, megaphyllous, should be used rather than *macro* (macrospore, etc.), since *mega*, from the Greek *megas*, means big, great, large, — equivalent to the Latin *magnus*, and is the opposite of *micro*. But *macro* means long, is not the opposite of *micro*, but of the Greek *brachus* which means short. If the idea is that of great size rather than of great length the prefix *mega* not *macro* should be used.

PARAPHYSES IN THE GENUS GLOMERELLA, by John L. Sheldon, is reported in Science, N. S. 23:851-2, 1 June 1906. Allusion to the fact is made, that there is no evidence that those who studied *Gloeosporium* (Atkinson, Stoneman, Clinton, Spaulding and von Schrenk) saw anything suggesting paraphyses — in fact, Clinton says 'there was no sign of paraphyses,' and Spaulding and von Schrenk in describing the genus *Glomerella* say that it is 'aparaphysate.' The author found in cultures of *G. rufomaculans* isolated from a Baldwin apple, perithecia containing long slender paraphyses.

FUNGI AS RELATED TO WEATHER and Fungi upon the Experiment Grounds — the former extracts from the weekly "Weather and Crop Bulletins;" the latter notes on the occurrence of a few parasitic fungi — are given on pp. 510-512 and 517 in the Report of the Botanist, [B. D. Halsted] N. J. Agr. Coll. Exp. Station Report for the year 1905, issued 1906.

A CAUSE OF FREAK PEAS is given with one half-tone illustration of abnormal plants in Torreya for April, 1906. The cause is *Ascochyta pisi* Lib., a fungus that attacks not only the growing pea-stems and leaves, but also the pods and thence may grow into the seed.

A KEY TO THE AGARICEAE OF TEMPERATE NORTH AMERICA is given by William A. Murrill in the Dec. No. (1905) of Torreya. The Agariceae here enumerated are not ordinary gill-fungi, but a subfamily of the Polyporaceae with furrowed hymenium. They are corky or woody, not fleshy. The genera included are Agaricus, Cerrena, Lenzites, Gloeophyllum and Cyeloporus. The key is carried to the species in each case — gotten up on the dichotomal plan.

A DISCUSSION OF FUENFSTUECK'S AND ZAHLBRUCKNER'S TREATMENT OF LICHENS in the Pflanzenfamilien is given by Albert Schneider in the May Torreyia (1905) under the title: The Classification of Lichens. They are not recognized as an autonomous group by all. There is great confusion with regard to the delimitation of lichen species. The number of good species (continues the author) is in all probability less than one-fifth of those actually described. The system of classification proposed by Zahlbruckner is excellent and should be generally adopted.

A LIST OF TWENTY ADDITIONAL SPECIES is given by G. A. Reichling in Torreyia, May 1905, as Contributions to the recorded Fungi and Slime-Mould Flora of Long Island.

GEORGE MASSEE GIVES AN INTERESTING ACCOUNT OF A FUNGUS parasitic on a Moss, in Torreyia, March 1906. It occurs on *Weisia viridula*, the capsule of the moss under normal conditions being usually erect and symmetrical, when attacked by the parasite however it becomes distinctly curved and unsymmetrical. The description is under the following name: *Epicoccum torquens* Massee n. sp.

FUNGI COLUMBIANI, CENTURY XXI, by Elam Bartholomew, is dated March 20, 1905. The following new species are included: *Cladosporium nervale* Ell. & Dearn. on living leaves of *Rhus typhina*; *Diaporthe ostryigena* Ell. & Dearn. on trunks and branches of *Ostrya virginica*; *Haplosporella conmixta* Barthol. on fallen limbs of *Ulmus pubescens*; *Polystigma adenostomatis* Farlow n. sp., on living leaves of *Adenostoma fasciculatum*; *Dichromera prunicola* Ell. & Dearn. on *Prunus virginiana*, and *Sphaeropsis magnoliae* Ell. & Dearn. on *Magnolia* (*acuminata*?). In this country the genus most largely represented is *Puccinia* with 26 pockets; there are 5 *Uromyces*, and 7 *Septorias*.

Some Factors in the color production in a species of *Fusarium* is discussed by Dr. J. B. Pollock, in Science N. S. 23:422-3, Mar. 16, 1906. The *Fusarium* taken from an ear of corn was under culture found to develop its bright salmon-pink only in bright sun light; moisture also is of significance — the moister the medium the less the color showed. Color varied on media of different constitutions — pale on cornstarch; on carrot, Hubbard squash and cornmeal the color was between roseous and testaceous (Sacc. Chrom.); on apple, onion and potato, almost exactly ochraceous; on wheat flour slightly paler than orange; on buckwheat flour it was darkest red, slightly redder than testaceous, on raw dahlia tubers bright red, but almost no color produced if the medium is steamed — and the fungus produced a green color.

In respect to the Parasitism of *Neocosmospora*, Howard S. Reed shows, in Science N. S. 23:751-2, May 11, 1906, that

it is a weak parasite (as previously claimed by Atkinson) and only attacks plants which are first debilitated by the presence of another fungus. The var. *nivea* (apparently) of *N. vasinfecta* was found as a wilt disease in the ginseng gardens of Missouri. The entrance seems to depend upon an anthracnose caused by *Vermicularia dematium*.

The Society of American Bacteriologists held the seventh annual meeting at the University of Michigan, Dec. 28-29, 1905. The report of the secretary, F. P. Gorham in Science N. S. 23:205-221, Feb. 9, 1906, presents a long list of papers and abstracts of same—the following seeming to be of systematic trend: Lactic Acid Bacteria, W. M. Esten; The Microscopic Estimate of Bacteria in Milk, Francis H. Slack; Kinds of Bacteria Concerned in Souring Milk, P. G. Heinemann; Bacteria of the Root Nodules of the Leguminosae, Karl F. Kellerman and T. D. Beckwith.

Two Mycological articles were read before the Botanical Society of America at the New Orleans Meeting, according to the report of the Secretary, William Trelease, Science N. S. Vol. XXIII, Feb. 9, 1906, pp. 221-2. They were as follows: J. C. Arthur, Cultures of Uredineae in 1905; and G. F. Atkinson, The Development of *Ithyphallus impudicus* (L.) Fries, from France.

Dr. N. M. Glatfelter gives a Preliminary list of Higher Fungi collected in the vicinity of St. Louis, Mo., from 1898 to 1905 in the Transactions of the Academy of Science at St. Louis, Vol. XVI, No. 4. The locality, date of occurrence and miscellaneous observations, besides the spore measurements in all cases, are given. About 500 species are listed. *Amanita* has 12 representatives, *Amanitopsis* 6, *Lepiota* 25, *Tricholoma* 8, *Clitocybe* 16, *Pleurotus* 8, *Collybia* 14, *Mycena* 10, and many others are equally well represented.

The Secretary's Report (by Francis E. Lloyd) of Sec. G. [Botany] American Association for the Advancement of Science, New Orleans, gives the following mycological papers (see Science N. S. 23:201-4, Feb. 4, 1906): Development of *Armillaria mellea*, and of *Agaricus campestris*, Geo. F. Atkinson; North American Species of *Peridermium*, J. C. Arthur and F. D. Kern. The following were presented at a joint meeting of the Section and the American Mycological Society: Some reasons for desiring a better classification of the Uredinales, J. C. Arthur; Uredineae of the Gulf States, S. M. Tracy; North American Gill Fungi, F. S. Earle; Lichens and recent conception of Species, Bruce Fink; Cultures of *Colletotrichum* and *Gloeosporium*, P. H. Rolfs; The Affinities of the Fungus of *Lolium temulentum*, E. M. Freeman; *Peridermium cerebrum* Peck and *Cronartium quercuum* (Berk.), C. L. Shear; Ramu-

laria: An Illustration of the Present Practice in Mycological Nomenclature, C. L. Shear; Notes on *Pachyma cocos*, P. H. Rolfs; *Penicillium glaucum* on Pineapple Fruits, P. H. Rolfs; Occurrence of *Fusoma parasiticum* Tubeuf in this Country, Perley Spaulding; Some Peculiar Fungi New to America, W. G. Farlow.

M. Prof. N. Patouillard describes many new species and one new genus in the Bulletin de la Société Mycologique de France, Tome XXII, 1er Fascicule, 28 Feb. 1906, pp. 45-62, under the title Champignons recueillis par M. Seurat dans la Polynésie française. The new genus is *Mapea* (Uredinaearum) — la désignation ist tirée du mot *Mape*, par lequel les indigènes Mangaréviens désignent *Inocarpus edulis*. The diagnosis is as follows: "Sori erumpentes, applanati, orbiculares, lati, ceracei, ambitu sinuoso-lobati, undique, fertiles. Sporae (uredosporae) fusciculæ, ovoideæ, verruculosæ, stipitæ" M. *ratia* n. sp. Hab. in fructibus *Inocarp*i *edulis*, Roruru, Ribitea.

Melanobasidium is the name of a new genus (Tuberculariees Dermatiees) proposed by M. A. Maublanc in an article Sur quelques espèces nouvelles ou peu connues de Champignon inférieurs, Bulletin de la Société Mycologique de France, Tome XXII, 1er Fascicule, 28 Feb. 1906. The description of the genus is as follows: "Foliicolum, maculicolum, sporodochia minima, erumpentia, atra, ex hyphis ramosis, septatis, intricatis composita, sporophoris cylindracis, densis, septatis, concoloribus vestita; conidia solitaria, acrogena, ovoidea, hyalina" M. *mali* n. sp. In foliis vivis *Piri mali* ad Sevillem, Hispaniæ. About a dozen new species besides are described.

What to note in the Macroscopic study of Lichens under the subheads: Introductory statement, The Thallus, General forms of Thalli, Sizes of Thalli, The surfaces of Thalli, Colors of Thalli, is told in the Bryologist, July, 1905; by Bruce Fink.

The Bulletin de la Société Mycologique de France, Tome XXII, 1er Fascicule contains the following: Ch. Van Bambeke. — De la valeur de l'épispore pour la détermination et le groupement des espèces du genre *Lycoperdon*; Corfec. — Excursion mycologique aux environs de Laval (Mayenne); Dr. Baret. — Note sur les Champignons vendus sur les marchés de Nantes en 1905; Em. Perrot. — Le Congrès international de Botanique a Vienne (1905); Peltureau — La Mycologie a l'Exposition de Vienne; Em. Boulanger — Note sur la Truffe; N. Patouillard. — Champignons recueillis par M. Seurat dans la Polynésie française. (Pl. I et II); A. Maublanc. — Sur quelques espèces nouvelles ou peu connues de Champignons inférieurs. A. Maublanc. — Quelques Champignons de l'Est africain. (Fig. texte);

F. Gueguen. — La moisissure des caves et des celliers; etude critique, morphologique et biologique sur le *Rhacodium cellare* Pers. (avec 3 planches,); L. Lutz. — Associations symbiotiques du *Saccharomyces Radaisii* Lutz; Bibliographie analytique.

M. le docteur Baret reports in the Bulletin de la Société Mycologique de France the following list of edible species sold in the market of Nantes during the year 1905: *Amanita cæsarea*, *Lepiota procera*, *L. rachodes*, *L. excoriata*, *L. pudica*, *Psalliota campestris*, *P. ammophila*, *P. arvensis*, *P. pratensis*, *P. sylvatica*, *P. bernardii*, *Clitopilus orcella*, *Marasmius oreades*, *Lentinus tigrinus*, *Tricholoma personatum*, *Clitocybe laccata*, *Boletus edulis*, *B. aestivalis*, *B. aereus*, *B. scaber*, *B. scaber* var. *auranticus*, *B. luteus*, *Fistulina hepatica*, *Hydnum repandum*, *Craterellus cornucopioides*, and *Lycoperdon giganteum*.

Bruce Fink's article in the March No. (1905) of the Bryologist on How to Collect and Study Lichens, deals fully with the subject under the following heads: Introductory, Collecting, Collecting Outfit, Where to Collect, Aids at Home, The Study at Home, and the Herbarium.

Further Notes on *Cladonias*, V, by Bruce Fink, the Bryologist, May 1905, deals with *Cladonia gracilis* (L.) Willd., widely distributed over North America, not occurring in the southern half of the United States. The varieties which are also fully described are *dilatata* (Hoffm.) Wainio *dilacerata* Flk., *chordalis* (Flk.) Shaer., *aspera* Flk., and *elongata* (Jacq.) Flk.

Lichenology for Beginners is the title of a very instructive article by Frederick Leroy Sargent in the May (1905) No. of the Bryologist. What these plants are is discussed, then their habits, distribution, etc., receive attention with suggestions for collecting and taking care of specimens. The second installment is found in the July No.; it is illustrated, fully explaining the characters of a *Parmelia*.

The Transactions of the British Mycological Society for the season 1904, published 13th May 1905, includes the following contents: Report of the Whitby Foray and complete list of Fungi and Mycetozoa gathered; Eriksson's recent researches on the vegetative life of the Cereal Rust Fungi, by Charles P. Plowright; Saccardo's *De diagnostica et nomenclatura mycologica*, *admonita quaedam*; Recent Researches on Parasitism, by R. H. Biffen; *Corticium* (*Peniophora*) *chrysanthemi*, by Charles B. Plowright, M. D.; Notes on three uncommon Fungi, by Cecil H. Sp. Percival; Fungi new to Britain, by Miss A. Lorrain Smith F. L. S. and Carleton Rea, B. C. L., M. A. & C.

An Index of the Mycological Writings of C. G. Lloyd, Vol. I, 1898-1905, [May 1905], Cincinnati, Ohio, U. S. A., is a pamphlet of 20 pages. Mr. Lloyd states: I have been working on the Gastromycetes for four or five years and have published the results as they appealed to me. This is an Index of the publications as far as the work has gone. As it is designated as Vol. I, "The intention is evident that others are expected to follow."

G. K. Merrill in Lichen Notes No. 2, see Bryologist for January 1906, refers (1) to the recent finding of *Umbilicaria pustulata papulosa* on a lower limb of a young spruce — very remarkable since the genus *Umbilicaria* is typically saxicoline; and (2) to the finding by Mrs. Agnes Ashworth, Central Point, Oregon, inmixed with *Evernia vulpina*; Mr. Merrill designates it *Cetraria islandica* (L) Ach. M. [modification] *arborialis* (conditional nomination).

New Species of Edible Philippine Fungi by Edwiningham Copeland, No. 28, July, 1905, Department of the Interior, Bureau of Government Laboratories, is a paper with English descriptions of several new species of Agarics and a Lycoperdon, these being translations of the Latin descriptions of the species as published in *Annales Mycologici*, Vol. 3, No. 1. Two species are illustrated by half-tones. The Basidiomycete flora of that country is said to be a very rich one in species if not in individuals.

In *Malpighia* Anno. XVIII. Fasc. X-XII, 1904, we find the following mycological articles: Dott. Teodoro Ferraris, *Enumerazione dei funghi della Valsesia* (seri terza) — an extended annotated list including the descriptions of twenty-two new species, and one page of illustrations; L. Cufino, *un secondo Contributo alla Flora Micologica della Provincia di Napoli* — a list of 57 species; L. Cufino, *Fungi Magnagutiani* — 42 species collected in the vicinity of Mantua and Faenza by Count Magnaguti.

New species of *Exoascaceae* — diagnoses in English of *Taphrina truncicola* Kusano, on *Prunus incisa*; *Taphrina piri* Kusano, on *Pirus miyabei* Sargent; and *Taphrina japonica*, on *Alnus japonica* S. et Z.; by S. Kusano, in the *Botanical Magazine*, Vol. XIX, Jan. 20th, 1905.

Ernest S. Salmon reports on the present aspect of the Epidemic of the American Gooseberry-Mildew in Europe in the *Journal of the Royal Horticultural Society*, Vol. XXIX, parts 1, 2 and 3, 1905. This [*Sphaerotheca mors-uvae* (Schw.) B. & C.] was recorded from Ireland in 1900; now it is reported from nine localities in six countries: From Russia it is reported from ten widely separated districts. The writer calls attention to the

widespread economic loss such a disease as the present one can cause. He refers to the history of the Vine-Mildew — appearing in Europe for the first time on hot-house vines at Margate in 1845, it spread the next year to hot-houses of that neighborhood. In 1847 it was reported from one locality in France; in 1848 from several localities in France and Belgium. It spread rapidly to other countries. By 1854 the vineyards in France were invaded to such an extent that the yield was reduced to one-tenth or one-twentieth. Similar to the early stages of this history are the circumstances attending the first outbreak of the American Gooseberry-Mildew, sec. Mr. Salmon.

Bulletin No. 85, Bureau of Plant Industry, U. S. Department of Agriculture, by B. M. Duggar, treats of the Principles of Mushroom Growing and Mushroom Spawn Making. The preface states that as an outcome of the work Dr. Duggar has already accomplished, spawn of pure-culture origin is now being produced on a very large scale by several growers and is giving excellent results. This method enables the grower to insure and maintain the most desirable varieties of mushroom.

Lichen Notes, No. 1, by G. K. Merrill, in the November No. of the Bryologist (1905), deals with *Cladonia verticillata* Hoffm., or *Cladonia gracilis* (L.) Nyl. var. *verticillata* Fr. The various North American forms receive extended comment.

Frederick LeRoy Sargent's IV and last installment of Lichenology for Beginners suggests an ecological study of these plants, and then outlines a mode of procedure preparatory to identifying species with the aid of books on the North American species—a brief bibliography being given. The article closes with a sample Key for about three dozen species.

On the Nomenclature of Fungi having many fruit-forms, by J. C. Arthur, in the Plant World, Volume 8, No. 3, March, and No. 4, April, 1905, places in clear light the question of choosing a name from a number of synonyms. The three stages of Wheat Rust, each when first discovered receiving a scientific name at the hands of botanists, is taken as an example for illustration. A point of great significance is contained in the following quotation: "It was Linneaus' great contribution to nomenclature that he restricted names to two terms, one generic and the other specific. By this change he did not eliminate the descriptive idea embodied in the name, *but he did superpose the appellative idea.*" He then proceeds to show that a name applies to the whole species, to all its variation in aspect, to every member of the species, and to each individual in all its stages of development, and in all its structural parts. Issue is taken with Magnus and Saccardo, and the contention is fortified that there is no objection to placing the Uredineae, and all other fungi, under

the same laws for nomenclature as are found serviceable for other plants, that is to say, the earliest name applied to a species is to be retained, even if given to an imperfect form or early stage in the cycle of development.

Professor George F. Atkinson gives in the *Plant World* for September and October, 1905, Outlines for the observation of some of the more common Fungi, such as Black Mould, Downy Mildews, White Rust, True Rusts, the Smuts, Puffballs, Earth-stars, Agarics, Ink-caps, Amanitas, Lepiotas, Polypori, Boleti, Clavarias, Helvellas, Powdery Mildews, and the Black Fungi.

Melville T. Cook gives a very full (popular) account of plant diseases caused by parasitic fungi (and insects) in Cuba for the past year in his Informe del Departamento de Patologia Vegetal, the article constituting pp. 147-207 inclusive of the Primer Informe Anual de la Estación Central Agronomica de Cuba, 1904-5. Some of the species especially mentioned are *Colletotrichum gleosporioides* Penzig, *Cladosporium elegans* Penzig, *Ophi-onectria coccicola* E. & E., *Ustilago zeae* (Beckm.) Ung., *Puccinia sorghi* Schw., *Cercospora gossypina* Cke. (está reconocido como el primer estado de *Mycosphaerella gossypina* [Cke.] Earle), *Melanconium sacchari*, *Leptosphaeria sacchari*, *Cercospora personata* (B. & C.) Ellis, *Uromyces arachnidis* P. Henn., *Uredo fici* Cast., *Septoria licopersici* Speg., *Cladosporium fulvum* Cke., *Phyllosticta hortorum*.

F. S. Earle, under the title *Algunos Hongos Cubanos*, in Primer Informe Anual de la Estación Central Agronomico de Cuba, I:225-246, I Junio 1906, gives diagnosis in Spanish of the following new Cuban species: *Pocillaria* [Lentinus] *reflexa*, *Po. vestida*, *Po. cinnamomea*, *Po. palmeri*, *Po. simulans*, *Phyllotus* [Pleurotus] *imbricatus*, *Ph. hygrophanus*, *Geopetalum* [Pleurotus] *eugeniae*, *Ge. album*, *Ge. brunescens*, *Crepidotus* [Pleurotus] *lentinoides*, *Galera simulans*, *Ga. grisea*, *Ga. cubensis*, *Gymnochilus* [Hypholoma] *flocculosus*, *Gy. campestris*, *Gy. musae*, *Gy. roystoniae*, *Gy. caespitosus* *Stropharia cubensis*, *Str. floccosa*, *Pholiotina* [Pholiota] *musae*, and *Pholiota cubensis*. These are preceded by half a dozen pages of general discussion of the group and particularly of the work on the Cuban Fungi to date. The first publication was by Montague in 1842, who noted 113 species. Charles Wright from 1856 to 1867 collected some fungi which were examined by Dr. M. A. Custer, who sent part of them to Rev. J. M. Berkley. This was the basis of the Fungi *cubensis*, 1859, in the *Journal of the Linnaean Society*. Late collectors named are L. M. Underwood, W. A. Murrill and F. S. Earle.

The Articles in *Annales Mycologici*, Vol. IV, No. 3, Juni 1906, are: Legarde, J., Contribution a l'Etude des Discomycetes

charnus; Rehm, H., Zum Studium der Pyrenomyceten Deutschlands, Deutsch-Oesterreichs und der Schweiz; Saccardo, P. A., Notae Mycologicae; Neger, F. W., Kleinere mycologische Beobachtungen; Hoehnel, Franz V. and Litschauer, Victor, Revision der Corticieen in Dr. J. Schroter's "Pilze-Schlesiens" nach seiner Herbar exemplaren; Schorstein, Joseph, Spörenkeimung in Sömete-lösing: Neue Literatur.

The Bulletin de la Société Mycologique de France, Tome XXII — 2er Fascicule, presents this sommaire: L. Dolland. — Observations sur le Mycenastrum Corium Desv. et sur le Bovista plumbea Pers. (Pl. VI); N. Patouillard et P. Hariot. — Fungorum novorum Decas secunda; A. de Jackzewski. — Notes phytopathologiques: Alternaria Grossulariae n. sp. et Colletotrichum Grossulariae n. sp.; Paul Vuillemin. — Un nouveau genre de Mucedinées: Hemispora stellata (Pl. VII); G. Bainier — Mycothèque de l'École de Pharmacie, III (Pl. VIII); Mycothèque de l'École de Pharmacie, IV (Pl. IX); Em. Boulanger. — Germination de la spore echinulee de la Truffe; F. Gueguen. — La moisissure des caves et des celliers; étude critique, morphologique et biologique sur le Rhacodium cellare Pers. (Fin); X. Gillot. — Nouveaux tableaux scolaires de Champignons. — Notes toximycologiques; M. Barbier. — Empoisonnement par l'Entoloma lividum. Ant. Magnin. — Les expositions mycologiques de Besancon. P. A. Saccardo. — Note sur les Herbiers mycologiques. Index bibliographique des travaux mycologiques parus en France et a l'étranger pendant l'année 1904.

A. P. MORGAN'S NORTH AMERICAN SPECIES OF MARASMIUS, published in the Journal of Mycology for September and November 1905 (vol. 11) and January 1906 (vol. 12) "is an attempt at an orderly arrangement of the species thus far enumerated in North America, including the West India Islands. It is only an endeavor to get together the scattered species so that some critical study of them may be made; hence the descriptions of the different authors are given as written and there is no indication of the synonyms which undoubtedly occur to some extent." He says these are small or minute Agarics, growing for the most part upon wood or among the dead leaves in woods; they are easily dried in good shape and make elegant specimens for the herbarium. The species are numerous, especially abounding in the forests of tropical regions. More than 500 species are listed in Saccardo's Sylloge, and Prof. Morgan includes 162 species as North American in this preliminary monograph. They are grouped under sections; these again are ranged in divisions, under which usually one or more sets of synoptical descriptive head-lines are given, thus practically furnishing a useful key for convenience in identifying the species. The parts have been issued as a *Separate*, bound together as one pamphlet.

A BULLETIN (No. 163, CALIFORNIA AGRICULTURAL EXPERIMENT STATION, Dec. 1904) by Ralph E. Smith is devoted to Pear Scab (*Fusicladium pirinum* Lib.), being an illustrated popular account, with economic notes.

A RUST-RESISTING CANTALOUPE FORMS BULLETIN 104, Colorado Agricultural Experiment Station, November 1905. The "rust" referred to is *Macrosporium cucumerinum* E. & E.

B. O. LONGYEAR PUBLISHED AN APPLE ROT due to an undescribed species of *Alternaria* as Bulletin 105, November 1905, Colorado Agr. Exp. Station. Besides the general account, the microscopical characters are given in detail and in figures.

D. R. SUMSTINE GIVES A BRIEF NOTE ON *WYNNEA AMERICANA* with new description of specimen collected at Ohio Pyle, Pa. See *Journal of Mycology*, March 1906.

SECOND SUPPLEMENT TO NEW GENERA OF FUNGI published since the year 1900, with citation and original description is given by P. L. Ricker in *Journal of Mycology*, March and May, covering 14 pages. This, like the first installment of the compilation, gives the genera in alphabetical order under the eight large groups of fungi.

PLANT DISEASES IN 1905, BY W. A. ORTON, Yearbook U. S. Dept. Agr. 1905; 602-611, 1906, is a résumé of plant disease compiled from reports of field observations by agents of the Department and officers of Experiment Stations. It indicates briefly the prevalence of the diseases in 1905 as compared with conditions in previous years. The diseases indicated by common names and the scientific name of the causative organism are grouped as heretofore under Pome Fruits; Stone Fruits; Small Fruits; Tropical Fruits; Vegetable and Field Crops; Cereals; Forage Crops; Fiber Plants; Nut, Forest, and Shade Trees; Greenhouse and Ornamental Plants.

THE VERTICILLIEAE, AND GONATOBOTRYTIDEAE are finished and the Hyalodidymae begun by Prof. Dr. Lindau in Rabenhorst's *Kryptogamen-Flora*, Erster Band, VIII Abteilung, Pilze, 97. Lieferung, 20 June 1905.

IN RABENHORST'S *KRYPTOGAMEN-FLORA*, I. Bd., VIII Abt., Pilze, 98. Lieferung, 15 Juli 1905, the Hyalodidymae are completed, and the Hyalophragmiae are carried to the Genus *Ramularia*.

TWO ARTICLES OCCUPY THE APRIL No. (Vol. IV) of the *Annales Mycologici*, namely: Fr. Bubák, Neue oder Kritische Pilze [second instalment, mostly new species, nos. 15-57] and J. Lagarde, Contribution à l'Étude des Discomycètes charnus.

M. PAUL VUELLIMIN GIVES THE NOUVEAU GENRE DE MUCEDINEES: *Hemispora stellata* in the Bulletin trimestrial de la So-

ciété Mycologique de France, tome XXII, 2er Fascicule, 15 May 1906. The new species *H. stellata* was found on the inferior face of a crust of *Aspergillus repens*. The diagnosis of the genus is as follows: *Hemispora* n. g. — Mycelium de Mucidinée-Macronémée abondant, hyalin, fin, cloisonné, ramifié, Tubes fertiles, ramifiés à la base. Chaque rameau conidiophore se termine par une vésicule (protoconidie) précédée d'un étranglement annulaire à paroi épaissie, brune, rigide. La vésicule se transforme, en tout ou en partie, en une série de segments sporiformes (deuteroconidies). Parfois elle s'allonge en un nouveau conidiophore ou émet des ramifications susceptibles de se comporter de même.

A PART OF THE BOTRYTIDAE is included in the 95th Lieferung of Rabenhorst's *Kryptogamen-Flora*, VIII Abt., Pilze, G. Lindau, issued 3 April 1905. The genera are numerous — *Ovularia* perhaps being the largest, having 50 or more species.

IN NOTAE MYCOLOGICAE, AUCTORE P. A. SACCARDO, *Annales Mycologici*, 4:273-8, Juni 1906, three new genera and many new species are described. The new genus *Endothiella* represents the pycnidium of *Endothia*; *Endothiella gyrosa* n. sp. is the type. *Muchmorium* represents a new genus *Dematiacearum*, the new species (*M. portoricensis*) occurs in rimis corticis arboris emortuae indet. pr. Signal Tower Hill, Ponce, Porto Rico (Rev. L. J. Muchmore). *Fairmania* belongs to the *Sphaeroidaceae*—"praecipue forma peculiari sporulae, soleae calcaneum exacte ornantis, ab *Epithyrio* subgenere *Coniothyrii* dignoscitur.

IN LIEFERUNGEN 96 (RABENHORST'S KRYPTOGAMEN-FLORA, PILZE, G. LINDAU, issued 10 May 1905), the Botrytidae are finished. There are enumerated between four and five dozen species of Botrytis. These are arranged under the sub-genera *Eubotrytis*, *Polyactis*, *Phymatotrichum* and *Cristatella*.

HEDWIGIA, BAND XLV, HEFT 3, 28 MARCH 1906, contains two articles to be listed here, namely: Theodor Brandt, Beiträge zur Anatomischen Kenntniss der Flechtengattung *Ramalina*; and P. Magnus, *Uropyxis rickiana* P. Magn. und die von ihr hervorgebrachte Krebsgeschwulst.

P. MAGNUS GIVES AN EXTENDED ACCOUNT OF *UROPYXIS RICKIANA* n. sp. und die von ihr hervorgebrachte Krebsgeschwulst, *Hedwigia* 45:173-177, Pl. IX, 28 Mar. 1906. The species was found in Brazil by Prof. J. Rick on some *Bignoniaceae*. "Die Gattung *Uropyxis* ist bisher in verhältnismässig wenigen Arten bekannt. . . . Mit Ausnahme der afrikanischen *Uropyxis Steudneri* P. Magn. und der asiatischen *U. Fraxini* (Kom.) P. Magn. stammen sie alle aus Amerika und treten dort zwei Gruppen von *Uropyxis*-Arten auf *Leguminosae* und auf *Berberis* auf. Zu ihnen tritt nun als dritte amerikanische Gruppe *Uropyxis rickiana* P. Magn. auf einer *Bignoniaceae*, und sicher

werden sich noch mehr *Uropyxis*-Arten in Amerika nachweisen lassen. Das südlichere Amerika scheint ein Zentrum der Gattung *Uropyxis* zu sein."

A CONTRIBUTION TO A REVISION OF THE NORTH AMERICAN HYDNACEAE forms Vol. 12 of the Memoirs of the Torrey Botanical Club, issued 13 June 1906, author Howard James Banker. The area covered includes the continent of North America and its adjacent Islands north of the Isthmus of Panama. Of the 500 known species not more than 200 have been found in our region. Dr. Banker's synopsis of genera shows the following names: *Hydnum*, *Hericium*, *Steccherinum*, *Echinodontium*, *Sarcodon*, *Hydnellum*, *Phellodon*, *Leaia*, *Auriscalpium*, *Grandiniodes*. The monograph contains full descriptions, ample notes and keys. The new species here proposed are as follows: *Hericium fimbriatum*, *Steccherinum morgani*, *St. adustulum*, *Sarcodon reticulatus*, *Sarcodon underwoodii*, *Hydnellum nuttallii*, *Hydnellum complicatum*, *Hydnellum earlianum*, *Phellodon ellisianus* and *Leaia piperata*. Two new genera are *Leaia* (*Hydnum stratosum* Berkeley, 1845), and *Grandinioides* (*Hydnum flavum* [Swartz 1835] Berkeley 1843). This important monograph also includes a Bibliography of 11 pages.

A LENGTHY LIST OF PARASITIC FUNGI collected near Triberg in August 1905 is given by Otto Jaap in the Botanische Zeitschrift, No. 7-8, August 1906, under the title Ein Kleiner Beitrag zur Pilzflora des Schwarzwaldes. He regards as of especial interest the following: *Dothidella geranii*, auf *Geranium silvaticum*, *Melampsorella blechni*, *Puccinia chrysosplenii*, auf *chrysosplenium oppositifolium*, *Phoma sagittalis* n. sp. auf *Cytisus sagittalis*, *Actinomena podagrariae*, *Ramularia prenanthis* n. sp., *Cercospora magnusiana* auf *Geranium silvaticum*, und *Passalora bacilligera* var. *alnobetulae* n. var. auf *Alnus alnobetula*.

A LIST OF ABOUT 3 DOZEN SPECIES and description of *Polyporus fagicola* n. sp. is given by William A. Murrill in the February No. of *Torrey* (1906). The collections were made in August and September 1905. The new species was found on the top of a fallen decorticated beech log in heavy mixed woods on the slope of Boarstone Mountains, Piscataquis Co., Maine. It has the habit of *Polyporus polyporus*.

A STUDY OF THE DEVELOPMENT OF ASCUS AND SPORE FORMS in Ascomycetes by J. Horace Faull is published in the Proceedings of the Boston Society of Natural History, vol. 32, No. 4, June 1905. No full report can here be given, but the eleventh item in this summary is as follows: The evidence points to the conclusion that while the ascus has probably not been derived from the sporangium of the Mucorineae, the phenomena of spore formation are not incompatible with the view that homologizes

the ascus with the zoosporangium, nor with the view that the Ascomycetes have originated from some such Phycomycetous group as the Peronosporineae or Saprolegniineae, an affinity first suggested by de Bary on the basis of sexuality.

THE VIII ABTHEILUNG, ERSTER BAND, RABENHORST'S KRYPTOGAMEN-FLORA contains the first installment of Hyphy-mycetes by G. Lindau, issued May 16, 1904. The general system used by Saccardo is here followed and the first pages of descriptions (beginning with *Sarcinomyces*, pertain to the Chromo-sporieae, a section of the Hyalosporae of the family Mucedinaceae. The descriptions of the species are rather brief, some notes are added especially in case of important pathogenic species and occasional figures in the text are given. Greater convenience would accrue had the generic name, especially when the species are very numerous, been repeated in full instead of being indicated by the initial letter, or better yet the full name repeated at the top of successive pages.

MANY GENERA, SOME WITH A LARGE NUMBER OF SPECIES, *e. g.* of *Oidium* (which are listed and described though noted in some cases as conidial forms of certain Ascomycetous species) are given by G. Lindau in 93. Lieferung, Ester Band, VIII Abtheilung of Rabenhorst's Kryptogamen-Flora (pp. 65-128), issued 30 June 1904. *Cephalosporium charticolum* is described as a new species, and *Eidamia* is established as a new genus of the Aspergillae.

P. A. SACCARDO GIVES MICROMYCETES AMERICANI NOVI—*Mycetes boreali-americi* a Doct. Fairman lecti (11 new species) and *Mycetes Mexicana* a Doct. S. Bonansea lecti (5 new species)—in the Journal of Mycology, March 1906. The diagnoses, notes, etc., are in Latin.

PROF. DR. F. BUBAK DESCRIBES 11 NEW SPECIES of North American fungi and one new genus under the title of Einige Neue Pilze aus Nord America, Journal of Mycology, March 1906. The new genus is as follows: *Pseudostegia* Bubák n. g. Melanconiacearum. The type species is *P. nubilosa*, Lexington, Ky., on leaves of *Carex* sp.—“Ein sehr interessanter Pilz, welcher mit meiner neuen Gattung *Anaphysomene* (Annales Mycologici 1906) verwandt ist. . . . “Es ist möglich, dass er als Konidienstadium zu *Stegia caricis* Peck (welche aber mit *Stegia subvelata* Rehm identisch ist) gehört. Es scheint mir dann weiter, dass *Cryptosporium nubilosum* Ell. et Ev. mit meinem Pilze identisch ist, denn ich vermute, dass die Breite der sporen nur durch einen Druckfehler statt 2.5μ - 8.5μ angegeben ist. Sollte meine Vermutung zutreffen, dann musste der vorliegende Pilz *Pseudostegia nubilosa* (Ell. et Ev.) Bubák genannt werden.”

ERNST A. BESSEY NOTES, IN THE JOURNAL OF MYCOLOGY for March 1906, the occurrence in this country of *Dilophospora*

alopecuri (Fr.) Fr. It was found on leaves of *Calamagrostis canadensis* among galls caused by nematodes.

PLEUROTUS HOLLANDIANUS SP. NOV. BY D. R. SUMSTINE is diagnosed in Latin, in the March (1906) No. of the Journal of Mycology. It is *P. petaloidei* affinis sed forma tomento pilei, latitudine lamellarum differt; collected on rotten trunks, Latrobe, Pa.

RUST NOTES FOR 1905, BY J. M. BATES, Journal of Mycology, March 1906. Records of cultures are given — April 6, *Puccinia subnitens* on *Monolepis nuttalliana* (some ripe aecidia noticed on May 12 but more on accompanying *Roripa sinuata* and *Bursa bursa-pastoris*); cultures also made on *Sophia incisa* — *Lepidium apetalum* also a good host. Culture of *Puccinia amphigena* on *Smilax hispida* — the latter covered with aecidia June 10. An *Oenothera biennis* with ripe aecidia covering the under side (hence not *Aec. Peckii*) associated with *Carex pennsylvanica* with uredo; elsewhere same was secured also III "which looks like a pale weak uredo" — pointing toward genetic connection and a new species.

THE ARTICLES IN THE JOURNAL OF MYCOLOGY FOR MAY 1906 are the following: Shear, *Peridermium cerebrum* Peck and *Cronartium Quercuum* (Berk); Morgan, North American Species of *Heliumyces*; Ricker, Second Supplement to New Genera (Concluded); Kellerman, Index to North American Mycology; Kellerman, Notes from Mycological Literature, XIX.

THE TABLE OF CONTENTS OF THE JOURNAL OF MYCOLOGY, March 1906, is as follows: Kellerman, Obituary, J. B. Ellis; Bates, Rust Notes for 1905; Saccardo, *Micromyces Americani* Novi; Bubák, *Neue Pilze aus Nord Amerika*; Bessey, *Dilophospora Alopecuri*; Sumstine, *Pleurotus Hollandianus* Sp. Nov.; Sumstine, Note on *Wynnea Americana*; Ricker, Second Supplement to New Genera; Kellerman, Index to North American Mycology; Kellerman, Notes from Mycological Literature XVIII; Shear, American Mycology Society.

THE TYLOSTOMEAE BY C. G. LLOYD, Cincinnati, Ohio, U. S. A., February 1906, pp. 1-28, Plates 74-85. Descriptions and abundance of figures (half tones). As treated they embrace all *Gastromyces* with dry spores, having peridia borne on distinct stalks that are not prolonged as axes. As thus defined [the author continues] it is a very natural tribe of Puffballs," differing from the *Podaxineae* which also have the peridia borne on stalks which, however, are continuous as axes of the gleba to the apices of the peridia. The genera he arranges as follows:

Peridium without definite mouth,

Volva none *Queletia*.

Volva thick, permanent *Dictyocephalos*.

Volva not permanent *Schizostoma*.

- Peridium opening circumscissily,
 Gleba with capillitium and "annulated cells". Battarreia.
 Gleba without these characters..... Battarreopsis.
 Peridium with definite mouths,
 Peridium seated on the broad apex of the
 stipe Chlamydopus.
 Stipe inserted into a socket at base of pe-
 ridium Tylostoma.

BY THE AID OF GRANTS FROM THE CARNEGIE INSTITUTION OF Washington, Edgar W. Olive carried on investigations which are published in the March and April Nos. of the Botanical Gazette, 1906, under the title Cytological Studies on the Entomophthoraceae: I. The Morphology and Development of *Empusa* [A new species is described, namely *Empusa sciaræ* Olive n. sp.]; II. Nucleae and Cell Divisions of *Empusa*. Plate XIV, XV and XVI.

JOHN L. SHELDON DISCUSSES THE RIPE ROT OR MUMMY DISEASE OF GUAVAS, as Bulletin 104, W. Va. Agr. Exp. Station, April 1, 1906. The disease was noticed in the greenhouses of the U. S. Department of Agriculture and a thorough study was made, also cultures and inoculations of apples and plums executed. The fungus proved to be *Gloeosporium psidii* G. Del. — a new species described by Delacroix a few months earlier. The ascigerous stage was found by Prof. Sheldon "corresponding in nearly every particular to the genus *Glomerella*." Accordingly the new name is given as follows: *Glomerella psidii* (G. Del.) Sheldon n. n.

UNDER THE TITLE OF A CULTURE MEDIUM for the Zygo-spores of *Mucor stolonifer* J. I. Hamaker, says (in Science, May 4, 1906 — N. S. Vol. 23, p. 710), that Zygosporos may be readily secured with proper conditions of moisture and temperature, — using as a substratum corn muffin bread; the atmosphere should be saturated and the temperature about 70° F.

THE 99. LIEFERUNG (FUNGI IMPERFECTI, HYPHOMYCETES) of Rabenhorst's Kryptogamen-Flora Erster Band, VIII Abteilung, by G. Lindau, 25 July 1906, pp. 433-512, continues but does not complete the species of *Ramularia*. The following are new species: *R. dianthi* Lindau on *Dianthus carthusianorum*, *R. epilobii rosei* Lindau on *Epilobium roseum*, *R. imperatoriae* Lindau on *Imperatoria ostruthium*, and *R. tozziae* Lindau on *Tozzia alpina*.

THE GENERA *ASPERGILLUS* AND *PENICILLUM* constitute the bulk of the 94th Lieferung of Rabenhorst's Kryptogamen-Flora, VIII Abteilung, pp. 129-176, G. Lindau, 15 July 1904. Very full notes are given of some of the important species. The 33 species of *Penicillium* are divided into 4 sections according to color. As an appendix to these Dr. Lindau enumerates 23 additional species

of Dierckx obtained by cultures but not fully coordinated with the previously published forms.

THE ARTICLES IN BULLETIN DE LA SOCIÉTÉ MYCOLOGIQUE de France, Tome XXI, 2er Fascicule are as follows: M. Boudier, nouvelles espèces de Chamignons de France (Pl. 3); P. Vuillemin, *Seurattia pinicola*, sp. nov. (Pl. 4); N. Patouillard, *Rolandina*, nouveau genre de Gymnoascées (Pl. 5); N. Patouillard et P. Hariot, *Fungorum novorum Decas prima*; Maublanc, Espèces nouvelles; Maublanc, *Trichoseptoria fructigena*; F. Gueguen, Homologie et évolution du *Dictyosporium toruloides* (pl. 8 et 9); V. Harlay, Empoisonnement par l'*Amanita phalloides*, a Flize (Ardennes).

RALPH E. SMITH HAS PREPARED A BULLETIN (California Agr. Exp. Station, Bulletin No. 165, pp. 1-99, January 1905) on *Asparagus* and *Asparagus Rust* in California which "represents primarily a report to certain asparagus growers, canners and dealers of San Francisco, Sacramento, and adjoining territory, who provided a fund of \$2,500 for the support of an investigation of the *Asparagus Rust*, a disease which seriously threatened to destroy or greatly injure their industry." The main topics are: The *Asparagus Rust*; History of the Disease in California; Nature of the Rust; Cause; The Mycelium; Spore Forms; Nature of the Injury; Amount of Loss; Yearly Life-History; Relation of Natural Condition of the Rust; and the Prevention or Control of *Asparagus Rust*; Rust Parasites. Under the last topic are mentioned the *Darlucella filum* Cast., *Tubercularia persicina* Ditt., *Cladosporium* sp. — "shows no structural difference from the ordinary *Clad. herbarum* Link, a very indefinite species."

DISEASES OF THE APPLE, CHERRY, PEACH, PEAR AND PLUM, forms Bulletin No. 132, Alabama Agr. Exp. Station, April 1905, E. Mead Wilcox — popular accounts for fruit-growers.

AN EXTENDED STUDY OF THE CHEMOTROPISM OF THE FUNGI by Harry R. Fulton, in the Botanical Laboratory of the University of Missouri, is published in the Feb. No. of the Botanical Gazette, 1906.

J. C. ARTHUR GIVES AN EXTENDED REVIEW of Sydow's *Monographia Uredinearum* with notes upon the American species in the January No. of the Journal of Mycology, 1905. "One is naturally surprised to find that just twice as many endemic species are credited to America as are found in Europe. One-fourth of all the species inhabit the *Compositae* and one-eighth of them occur on the *Gramineae*." We give a list of those that should be made synonyms:

Puccinia cornigera E. & E. should be made a synonym of *P. actinellae* (Webb.) Syd.

Puccinia longipes Lagh. should be made a synonym of *P. vernoniae* Schw.

Puccinia aplopappi Syd. should be made a synonym of *P. tuberculans* E. & E.

Puccinia similis E. & E. should be made a synonym of *P. absinthii* DC.

Puccinia recondita D. & H. should be made a synonym of *P. conferta* D. & H.

Puccinia magnoecia E. & E. should be made a synonym of *P. asteris* Duby.

Puccinia inclusa Syd. should be made a synonym of *P. cirsii* Lasch.

Puccinia californica Diet. should be made a synonym of *P. cirsii* Lasch.

Puccinia confluens Syd. should be made a synonym of *P. erigerontis* E. & E.

Puccinia gutierreziae E. & E. should be made a synonym of *P. grindeliae* Pk.

Puccinia lagophyllae D. & H. should be made a synonym of *P. hemizoniae* E. & T.

Puccinia nardosmiae E. & E. should be made a synonym of *P. conglomerata* (Str.) K. & S.

Puccinia tracyi Sacc. & Syd. should be made a synonym of *P. solidaginis* Pk.

Puccinia philibertiae E. & E. should be made a synonym of *P. gonolobi* Rav.

Puccinia cymopteri D. & H. should be made a synonym of *P. jonesii* Pk.

Puccinia asperior E. & E. should be made a synonym of *P. jonesii* Pk.

Puccinia microica Ellis should be made a synonym of *P. cryptotaeniae* Pk.

Puccinia lindrothii Syd. should be made a synonym of *P. jonesii* Pk.

Puccinia sphaelerocondra Lindr. should be made a synonym of *P. jonesii* Pk.

Puccinia thompsonii Hume should be made a synonym of *P. sambuci* (Schw.) Arth.

Puccinia omnivora E. & E. should be made a synonym of *P. windsoriae* Schw.

Puccinia procera D. & H. should be made a synonym of *P. montanensis* Ellis.

Puccinia substerilis E. & E. should be made a synonym of *P. stipae* Arth.

Puccinia bakeriana Arth. should be made a synonym of *P. ellisii* DeT.

SOME OF THE CONTENTIONS OF EDWARD READ MEMMINGER under the title of *Agaricus amygdalinus* M. A. C. (see *Journal of Mycology*, Jan. 1905) are as follows: "As far as our research shows, *Agaricus amygdalinus* has never been technically de-

scribed, and the first appearance of the name in print was in Curtis's List of the Fungi in the Geological and Natural History Survey of North Carolina published in 1867. It is not surprising, therefore, that so little being known. . . . We think it susceptible of proof, that this plant was first published by Curtis as *Agaricus fabaceus* Berk., then this determination not proving satisfactory, it was united by Ravenel with *Ag. campestris* Linn.; dissatisfaction still existing it was finally segregated as *Agaricus amygdalinus* by Curtis. . . . From the foregoing it would seem that the geographical distribution of *Ag. amygdalinus* would be from Massachusetts to Texas. . . . Until, therefore, it is conclusively proved that *Ag. amygdalinus* and *Ag. fabaceus* are one and the same species, it is proper to confine the description to *Ag. fabaceus* strictly to the words of Berkeley, and no argument for the identity of these species, based on similarity of taste and odor, drawn from Curtis's statement in Silliman's Journal, above quoted, can have any weight or force."

THE INDEX TO NORTH AMERICAN MYCOLOGY, which is an alphabetical list of articles, authors, subjects, new species and hosts, new names and synonyms, by W. A. Kellerman appeared in instalments in 1905 in the May, July, and September No.'s of the Journal of Mycology. This comprehensive index includes everything in its scope that has appeared since the end of the year 1900. Each instalment is printed as a separate — on one side of the page only so that it may be cut and pasted on cards making a convenient library card index.

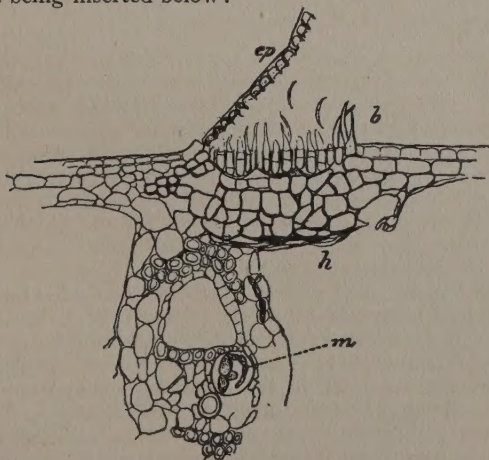
J. C. ARTHUR'S CULTURES OF UREDINEAE IN 1905, being the sixth of a series of reports by the author upon the cultures of plant rusts, gives (see Journal of Mycology, Jan. 1906) an account of 194 sowings of spores, representing 45 species of rusts, and for that purpose 100 species of hosts were utilized which were grown temporarily in pots in the greenhouse. The summary shows that 20 successful cultures were made with species previously reported, and 10 with species now reported for the first time. The latter are as follows: 1. *Puccinia silphii* Schw. — Resting teleutospores from *Silphium integrifolium* Michx. sown on same host; 2. *Puccinia grindeliae* Pk. — Resting teleutospores from *Gutierrezia sarothrae* (Pursh) B. & R. sown on same host; 3. *Puccinia solidaginis* Pk. — Resting teleutospores from *Solidago trinervata* Greene, sown on *S. canadensis* L.; 4. *Puccinia transformans* E. & E. — Resting teleutospores from *Stenolobium Stans* (L.) Don. sown on same host; 5. *Puccinia kuhniae* Schw. — Teleutospores from *Kuhnia eupatorioides* L. sown on same host; 6. *Puccinia canaliculata* (Schw.) Lagerh. — Aecidiospores from *Xanthium canadense* Mill. sown on *Cyperus esculentus* L.; 7. *Puccinia eleocharidis* Arth. — Teleutospores from *Eleocharis palustris* (L.) R. & S. sown on *Eupa-*

torium perfoliatum L. 8. *Puccinia substerilis* E. & E. — Amphispores from *Stipa viridula* Trin. sown on the same host; 9. *Puccinia seymouriana* Arth. — Teleutospores from *Spartina cynosuroides* Willd. sown on *Cephalanthus occidentalis* L.; 10. *Uromyces acuminatus* Arth. — Teleutospores from *Spartina cynosuroides* Willd. sown on *Steironema ciliatum* (L.) Raf.

FRED. J. SEAVER DESCRIBES A NEW SPECIES OF SPHAEROSOMA [*S. echinulatum*] in the Journal of Mycology, Jan. 1905. The plant was collected on the surface of damp soil between the tufts of grass in an open place on the margin of the woods. It is illustrated by a full page plate.

A DISEASE OF BLACK OAKS CAUSED BY POLYPORUS OBTUSUS BERK. is presented by Perley Spaulding in the 16th Annual Report of the Missouri Botanical Garden, 1905. The species is American — not very generally known — and Mr. Spaulding has found it causing disease locally in Missouri and northern Arkansas. It is a true saprophyte. The rot extends up and down in the heart wood until the tree is so weakened that it breaks over or dies outright. It was found that the sporophores were growing out of the entrances of burrows made by some wood-boring insects. Three half-tone plates illustrate the species and two illustrate the insects burrows.

Through inadvertancy a cut to appear on p. 56 was omitted, the same being inserted below:



Pseudostegia nubilosa Bubák. — Radialer Schnitt: *ep*, deckelartig aufgehobene Epidermis mit den Scheiteln der dekapitierten Zellen; *b* Borsten; *h*, Hyphostroma; *m* Mycel. (240/1).

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EDITOR'S NOTES.

An inspection of a number of Botanical Periodicals reveals the fact that the exact date of issue is usually printed *in the same No.*, sometimes on the last page, in other cases on the cover; very few Journals fail to do this but instead give this date in the *next issue*. It would seem then generally feasible to have the date of issue accompany the No. to which it pertains. There could be no question as to the desirability, we might for practical purposes (at least for convenience) say the *necessity* of doing so.

Periodicals are intended, as indicated by their pagination, volume numbering, index, etc., to be bound at the close of certain periods; then the query comes why should the *number* of the issue be printed on the first page or any other page of the issue; according to our judgment this should be given on the *cover* only. It is a temporary convenience to the librarian or to the subscriber, and is no advantage when the No.'s, or parts, are bound into a volume. In fact it then is often a disadvantage, particularly in making a citation, because one must stop to determine whether that item needs to be given.

In order that a reader or indexer may orient himself readily and continuously, it is desirable that when the periodical is open at any and all parts he may see the *page* number (at the top, extreme left and extreme right), the name of the *Journal* (on the left), title of *article* (on right), the *volume* number and the *date-designation*; in addition some periodicals give the author of the article. Even if then a signature, or single leaf, becomes accidentally displaced, it can be restored quickly and without possible error.

An extremely small almost negligible fraction of even one per cent. of readers, desire the date of issue of any periodical as opposed to its ordinary date-designation, as January, March, 1st Quarter of 1906, etc. However, I would make this matter perhaps stronger than stated in the preceeding No., where I suggested that it "*might be desirable*" to give the date of issue in addition to the date-designation of the No., Part, Heft, Lieferung, etc. Thus for an example: Sydow, H. et P. Neue und kritische Uredineen—IV. Ann. Mycolog. 4:28-32, Feb. 1906. [Issued 5 Apr. 1906.]

Journal of Mycology, Vol. 12, pp. 136-184, Issued September 29, 1906.